Usenet Newsgroup Archive: rec.radio.amateur.space

1993

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Date span: 1993-07-07 through 1993-12-31

Source text: rec.radio.amateur.space.txt

Source item: https://archive.org/details/usenet-rec

Messages included in this PDF: 544

Messages are presented chronologically by archived date.

Binary or encoded payloads are not printed as blocks of encoded text; a placeholder appears where such material was detected. The original source text is unchanged.

1. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-07-07 16:27:53 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-742062461@unomaha.edu>
Source record: 28661
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

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Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
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Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
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arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

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Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

2. Re: WANTED: Space Probe Updates!

Newsgroup: rec.radio.amateur.space
Date: 1993-07-07 18:59:19 UTC
From: wsears@organpipe.uug.arizona.edu
Message-ID: <1993Jul7.185919.13831@organpipe.uug.arizona.edu>
Source record: 28662

dar110@psuvm.psu.edu wanted to know where to get the notices on
the space probes. I get them from the usenet group alt.sci.plantary.
I believe that they are also sent to sci.space. If you do not
get these groups, I can look up some of the archives. The best
space archive I can come up with off the top of my head is
ames.arc.nasa.gov login anonymous

Good luck.

de KG7IO
--
William Sears | 'I reserve the right to ask irrelevant
Lunar and Planetary Lab | questions, even impudent ones.
wsears@lpl.arizona.edu | You, of course, don't have to answer.'"

3. Frequencies for amateur satellites?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-08 18:40:50 UTC
From: anderjh@ducvax.auburn.edu
Message-ID: <1993Jul8.134050.1@ducvax.auburn.edu>
Source record: 28663

I recently downloaded PCTrack from wuarchive and found it very interesting. I have heard a couple of satellites on my HT with a 5/8 wave magnet mount antenna. The satellites that are preprogrammed into PCTrack do not include frequencies. Can someone give me a list of some amateur satellites with frequencies that I might be able to hear with my Kenwood TH-28A and the 5/8 wave antenna.
Jamie ANDERJH@DUCVAX.AUBURN.EDU

4. Re: Frequencies for amateur satellites?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-09 12:40:23 UTC
From: stephens@geod.emr.ca
Message-ID: <stephens.742221623@ngis>
Source record: 28664

anderjh@ducvax.auburn.edu writes:

>I recently downloaded PCTrack from wuarchive and found it very interesting.
>I have heard a couple of satellites on my HT with a 5/8 wave magnet mount
>antenna. The satellites that are preprogrammed into PCTrack do not include
>frequencies. Can someone give me a list of some amateur satellites with
>frequencies that I might be able to hear with my Kenwood TH-28A and the 5/8
>wave antenna.
> Jamie ANDERJH@DUCVAX.AUBURN.EDU

This is about the N++ time on this net someone has asked for the
frequencies of Amateur Radio Satellites. AMSAT hands out a pamphlet that
lists the current frequencies. Perhaps someone has that list in
ASCII form and could post it here, or even put it in an archive!
VE3PYG
--
Dave Stephenson
Geological Survey of Canada
Ottawa, Ontario, Canada *Om Mani Padme Hum 1-2-3*
Internet: stephens@geod.emr.ca

5. ORBS$191, .AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-07-09 20:55:46 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-191.o@ampr.org>
Source record: 28674
Cross-posted to: rec.radio.info,rec.radio.amateur.space

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SB KEPS @ AMSAT $ORBS-191.O
Orbital Elements 191.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX July 10, 1993
BID: $ORBS-191.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93188.53303997
Element set: 6
Inclination: 27.0196 deg
RA of node: 16.9348 deg
Eccentricity: 0.6027383
Arg of perigee: 95.8219 deg
Mean anomaly: 331.6625 deg
Mean motion: 2.05886544 rev/day
Decay rate: -1.43e-06 rev/day^2
Epoch rev: 7568
Checksum: 324

Satellite: UO-11
Catalog number: 14781
Epoch time: 93187.16594821
Element set: 423
Inclination: 97.8090 deg
RA of node: 212.7206 deg
Eccentricity: 0.0011652
Arg of perigee: 303.1422 deg
Mean anomaly: 56.8661 deg
Mean motion: 14.69021226 rev/day
Decay rate: 3.39e-06 rev/day^2
Epoch rev: 49950
Checksum: 296

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93187.62319590
Element set: 629
Inclination: 82.9235 deg
RA of node: 224.2461 deg
Eccentricity: 0.0009931
Arg of perigee: 265.4158 deg
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Mean anomaly: 94.5835 deg
Mean motion: 13.72319547 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 30251
Checksum: 321

Satellite: AO-13
Catalog number: 19216
Epoch time: 93184.69450408
Element set: 616
Inclination: 57.9978 deg
RA of node: 307.8211 deg
Eccentricity: 0.7229262
Arg of perigee: 318.7860 deg
Mean anomaly: 4.8917 deg
Mean motion: 2.09717250 rev/day
Decay rate: 1.18e-06 rev/day^2
Epoch rev: 3870
Checksum: 327

Satellite: FO-20
Catalog number: 20480
Epoch time: 93189.61407106
Element set: 450
Inclination: 99.0338 deg
RA of node: 41.7405 deg
Eccentricity: 0.0541462
Arg of perigee: 38.1460 deg
Mean anomaly: 325.6705 deg
Mean motion: 12.83220244 rev/day
Decay rate: -8.0e-08 rev/day^2
Epoch rev: 16006
Checksum: 267

Satellite: AO-21
Catalog number: 21087
Epoch time: 93189.74092111
Element set: 804
Inclination: 82.9410 deg
RA of node: 36.8784 deg
Eccentricity: 0.0035079
Arg of perigee: 323.9169 deg
Mean anomaly: 35.9605 deg
Mean motion: 13.74521438 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 12240
Checksum: 303

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93179.26235602

Element set: 408
Inclination: 82.9214 deg
RA of node: 273.9003 deg
Eccentricity: 0.0030785
Arg of perigee: 15.3636 deg
Mean anomaly: 344.8447 deg
Mean motion: 13.74023675 rev/day
Decay rate: 2.3e-07 rev/day^2
Epoch rev: 12004
Checksum: 286

/EX
SB KEPS @ AMSAT $ORBS-191.D
Orbital Elements 191.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX July 10, 1993
BID: $ORBS-191.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93182.20971269
Element set: 756
Inclination: 98.6116 deg
RA of node: 266.3259 deg
Eccentricity: 0.0011387
Arg of perigee: 137.8139 deg
Mean anomaly: 222.3924 deg
Mean motion: 14.29779930 rev/day
Decay rate: 8.9e-07 rev/day^2
Epoch rev: 17943
Checksum: 341

Satellite: AO-16
Catalog number: 20439
Epoch time: 93182.20920941
Element set: 561
Inclination: 98.6204 deg
RA of node: 267.2224 deg
Eccentricity: 0.0011700
Arg of perigee: 138.8191 deg
Mean anomaly: 221.3877 deg
Mean motion: 14.29838853 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 17944
Checksum: 308

Satellite: DO-17
Catalog number: 20440
Epoch time: 93182.19733455
Element set: 563

Inclination: 98.6207 deg
RA of node: 267.4254 deg
Eccentricity: 0.0011569
Arg of perigee: 137.7846 deg
Mean anomaly: 222.4232 deg
Mean motion: 14.29974855 rev/day
Decay rate: 7.0e-07 rev/day^2
Epoch rev: 17945
Checksum: 327

Satellite: WO-18
Catalog number: 20441
Epoch time: 93182.09704417
Element set: 565
Inclination: 98.6204 deg
RA of node: 267.3487 deg
Eccentricity: 0.0012118
Arg of perigee: 139.6471 deg
Mean anomaly: 220.5611 deg
Mean motion: 14.29954643 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 17944
Checksum: 311

Satellite: LO-19
Catalog number: 20442
Epoch time: 93182.72776255
Element set: 562
Inclination: 98.6202 deg
RA of node: 268.1509 deg
Eccentricity: 0.0012392
Arg of perigee: 136.8810 deg
Mean anomaly: 223.3349 deg
Mean motion: 14.30044283 rev/day
Decay rate: 5.4e-07 rev/day^2
Epoch rev: 17954
Checksum: 302

Satellite: UO-22
Catalog number: 21575
Epoch time: 93181.75491313
Element set: 261
Inclination: 98.4723 deg
RA of node: 257.6484 deg
Eccentricity: 0.0007068
Arg of perigee: 262.5900 deg
Mean anomaly: 97.4484 deg
Mean motion: 14.36835221 rev/day
Decay rate: 9.0e-07 rev/day^2
Epoch rev: 10261
Checksum: 303

Satellite: KO-23
Catalog number: 22077
Epoch time: 93185.38088294
Element set: 106
Inclination: 66.0765 deg
RA of node: 288.1820 deg
Eccentricity: 0.0003939
Arg of perigee: 181.8255 deg
Mean anomaly: 178.2750 deg
Mean motion: 12.86279208 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 4205
Checksum: 300

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93145.00000000
Element set: 008
Inclination: 1.0950 deg
RA of node: 130.8800 deg
Eccentricity: 0.2939760
Arg of perigee: 137.2680 deg
Mean anomaly: 355.5380 deg
Mean motion: 1.42273540 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 24
Checksum: 212

/EX
SB KEPS @ AMSAT $ORBS-191.W
Orbital Elements 191.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX July 10, 1993
BID: $ORBS-191.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93190.09204634
Element set: 407
Inclination: 99.0994 deg
RA of node: 230.6517 deg
Eccentricity: 0.0015941
Arg of perigee: 105.3863 deg
Mean anomaly: 254.9082 deg
Mean motion: 14.13529980 rev/day
Decay rate: 1.05e-06 rev/day^2
Epoch rev: 44187
Checksum: 311

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93190.04984656
Element set: 249
Inclination: 98.5148 deg
RA of node: 204.4118 deg
Eccentricity: 0.0012055
Arg of perigee: 251.7616 deg
Mean anomaly: 108.2250 deg
Mean motion: 14.24819645 rev/day
Decay rate: 1.74e-06 rev/day^2
Epoch rev: 35374
Checksum: 313

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93179.53392611
Element set: 873
Inclination: 82.5425 deg
RA of node: 189.8915 deg
Eccentricity: 0.0017812
Arg of perigee: 90.0109 deg
Mean anomaly: 270.3093 deg
Mean motion: 13.84687227 rev/day
Decay rate: 3.6e-07 rev/day^2
Epoch rev: 27341
Checksum: 320

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93188.93243038
Element set: 46
Inclination: 82.5405 deg
RA of node: 207.2691 deg
Eccentricity: 0.0018283
Arg of perigee: 39.4130 deg
Mean anomaly: 320.8307 deg
Mean motion: 13.16959926 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 23794
Checksum: 308

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93189.90973488
Element set: 157
Inclination: 99.1337 deg
RA of node: 166.1349 deg
Eccentricity: 0.0012525
Arg of perigee: 21.7612 deg
Mean anomaly: 338.4089 deg
Mean motion: 14.12894205 rev/day
Decay rate: 1.13e-06 rev/day^2

Epoch rev: 24674
Checksum: 317

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93187.16177012
Element set: 811
Inclination: 82.5200 deg
RA of node: 59.8020 deg
Eccentricity: 0.0014616
Arg of perigee: 112.0303 deg
Mean anomaly: 248.2412 deg
Mean motion: 13.84339133 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 21981
Checksum: 269

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93177.99926999
Element set: 718
Inclination: 82.5531 deg
RA of node: 157.9524 deg
Eccentricity: 0.0017135
Arg of perigee: 87.7200 deg
Mean anomaly: 272.5856 deg
Mean motion: 13.16021137 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 17639
Checksum: 323

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93183.29810991
Element set: 563
Inclination: 82.5473 deg
RA of node: 126.3915 deg
Eccentricity: 0.0017563
Arg of perigee: 52.2629 deg
Mean anomaly: 308.0121 deg
Mean motion: 13.84176858 rev/day
Decay rate: 2.6e-07 rev/day^2
Epoch rev: 15221
Checksum: 304

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93189.75070264
Element set: 592
Inclination: 98.8663 deg
RA of node: 215.4502 deg

Eccentricity: 0.0014434
Arg of perigee: 244.9294 deg
Mean anomaly: 115.0373 deg
Mean motion: 14.01311460 rev/day
Decay rate: -2.02e-06 rev/day^2
Epoch rev: 14560
Checksum: 286

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93186.69132767
Element set: 568
Inclination: 82.5263 deg
RA of node: 61.6731 deg
Eccentricity: 0.0012500
Arg of perigee: 305.5146 deg
Mean anomaly: 54.4849 deg
Mean motion: 13.83553511 rev/day
Decay rate: 5.7e-07 rev/day^2
Epoch rev: 13984
Checksum: 308

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93190.07879213
Element set: 368
Inclination: 82.5439 deg
RA of node: 52.2578 deg
Eccentricity: 0.0019117
Arg of perigee: 338.9085 deg
Mean anomaly: 21.1246 deg
Mean motion: 13.16823972 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10620
Checksum: 293

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93190.04630929
Element set: 612
Inclination: 98.6557 deg
RA of node: 219.7347 deg
Eccentricity: 0.0013330
Arg of perigee: 146.4918 deg
Mean anomaly: 213.7103 deg
Mean motion: 14.22284256 rev/day
Decay rate: 2.20e-06 rev/day^2
Epoch rev: 11175
Checksum: 279

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93189.47456972
Element set: 436
Inclination: 82.5524 deg
RA of node: 359.4790 deg
Eccentricity: 0.0014040
Arg of perigee: 340.6199 deg
Mean anomaly: 19.4387 deg
Mean motion: 13.16822686 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9122
Checksum: 325

/EX
SB KEPS @ AMSAT $ORBS-191.M
Orbital Elements 191.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX July 10, 1993
BID: $ORBS-191.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93189.98397073
Element set: 167
Inclination: 51.6214 deg
RA of node: 110.0517 deg
Eccentricity: 0.0005913
Arg of perigee: 180.1109 deg
Mean anomaly: 180.0321 deg
Mean motion: 15.58709119 rev/day
Decay rate: 8.567e-05 rev/day^2
Epoch rev: 42253
Checksum: 295

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93189.68440514
Element set: 138
Inclination: 28.4708 deg
RA of node: 285.7171 deg
Eccentricity: 0.0004343
Arg of perigee: 271.6925 deg
Mean anomaly: 88.3079 deg
Mean motion: 14.92757133 rev/day
Decay rate: 9.72e-06 rev/day^2
Epoch rev: 17473
Checksum: 321

Satellite: GRO
Catalog number: 21225

Epoch time: 93190.18302235
Element set: 936
Inclination: 28.4629 deg
RA of node: 136.2308 deg
Eccentricity: 0.0005152
Arg of perigee: 176.6548 deg
Mean anomaly: 183.4111 deg
Mean motion: 15.73506268 rev/day
Decay rate: 2.1509e-04 rev/day^2
Epoch rev: 358
Checksum: 282

Satellite: TUBSAT
Catalog number: 21577
Epoch time: 93189.75230741
Element set: 265
Inclination: 98.4722 deg
RA of node: 265.0793 deg
Eccentricity: 0.0004885
Arg of perigee: 243.5781 deg
Mean anomaly: 116.4904 deg
Mean motion: 14.36385036 rev/day
Decay rate: 1.22e-06 rev/day^2
Epoch rev: 10373
Checksum: 305

Satellite: SARA
Catalog number: 21578
Epoch time: 93185.76686873
Element set: 434
Inclination: 98.4764 deg
RA of node: 262.8656 deg
Eccentricity: 0.0004008
Arg of perigee: 253.6445 deg
Mean anomaly: 106.4304 deg
Mean motion: 14.38465520 rev/day
Decay rate: 4.52e-06 rev/day^2
Epoch rev: 10325
Checksum: 312

Satellite: UARS
Catalog number: 21701
Epoch time: 93180.90809607
Element set: 249
Inclination: 56.9829 deg
RA of node: 130.4931 deg
Eccentricity: 0.0005121
Arg of perigee: 81.4948 deg
Mean anomaly: 278.6647 deg
Mean motion: 14.96666224 rev/day
Decay rate: -8.39e-06 rev/day^2

```
Epoch rev: 9820
Checksum: 324

/EX
```

6. Contructional details for 2m helical

Newsgroup: rec.radio.amateur.space
Date: 1993-07-09 21:30:25 UTC
From: smace@nyx.cs.du.edu
Message-ID: <1993Jul9.213025.4213@mnemosyne.cs.du.edu>
Source record: 28665
Cross-posted to: rec.radio.amateur.antenna,rec.radio.amateur.space

I'm trying to build a huge 6 turn helical antenna for the 137mhz to
138mhz weather sat band. I've made a prototype out of 1x1 pine frame
with no. 8 wire for the helix, and a reflector screen made from
a few large peices of heavy duty screen. So far I have obtained
excellant results. The porblem is that the thing is so darn heavy.
When I turn it the rotational torque shakes my mast, a 16 foot 2" steel
pipe. I have this thing mounted at the center of gravity, so I don't
need a huge counter weight for the elevation rotor. The rotor is a
Yaesu G5400B. I've read about delayed braking circuits etc, but I
think it would be easier to reduce the rotational tourqe by either makeing
it smaller of lighter. I had a crossed yagi on the mast before that was
about the same length but might lighter and the rotor handled it fine.

If anyone has built an antenna like this, I would like to know the contruction
details.

BTW, this antenna will be for receiving only of course.

Thanks
Scott Mace
--
****
* Scott Mace internet: smace@nyx.cs.du.edu *
* emace@tenet.edu *
****

7. C64 SuperTrak

Newsgroup: rec.radio.amateur.space
Date: 1993-07-10 04:57:58 UTC
From: jim@inqmind.bison.mb.ca
Message-ID: <BZgg7B1w165w@inqmind.bison.mb.ca>
Source record: 28667

There was a message a couple of weeks ago re: a bug in SuperTrak which is a Commodore 64 satellite tracking program.

Currently, I'm using VR85 which was released in 1985. It's an OK kind of program, but I'd like to know if SuperTrak is any better than VR85.

I'm NOT currently a member of AMSAT where these 2 programs come from so I am not up to date as to the current features of various satellite tracking software. I use PC-Track 2.14 for the PC though. It's very good!

How much does SuperTrak cost through AMSAT?

Thanks in advance.

Jim
VE4JAF

jim@inqmind.bison.mb.ca
The Inquiring Mind BBS, Winnipeg, Manitoba 204 488-1607

8. Re: Frequencies for amateur satellites?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-10 04:59:47 UTC
From: ab376@Freenet.carleton.ca
Message-ID: <C9xn7n.lqt@freenet.carleton.ca>
Source record: 28666

In a previous article, stephens@geod.emr.ca (Dave Stephenson) says:

>lists the current frequencies. Perhaps someone has that list in
>ASCII form and could post it here, or even put it in an archive!

Recently found this listing.

Hi All,

Here is a very good Satellite Guide.

From: IK8LNE@IK8DTG.PZ.ITA.EURO
To : ALL@WW

+++Radio Amateur Satellite Frequency Guide (1/2)
--A M S A T--

AMSAT-OSCAR 10

General Beacon 145.809 MHz (Unmodulated carrier)
Engineering Beacon 145.987 MHz (Switched off)
Mode B Uplink 435.030 - 435.180 MHz (SSB,CW)
Mode B Downlink 145.825 - 145.975 MHz (SSB,CW,inverting)

UoSAT-OSCAR 11

Beacon 145.826 MHz (AFSK/FM)
Beacon 435.025 MHz (AFSK/FM)
Beacon 2401.50 MHz (AFSK/FM)

Radio Sputnik 10

Beacon/ROBOT 29.357 MHz (CW)
Beacon/ROBOT 29.403 MHz (CW)
Mode A Uplink 145.860 - 145.900 MHz (SSB,CW)
Mode A Downlink 29.360 - 29.400 MHz (SSB,CW)
ROBOT A Uplink 145.820 MHz (CW)
ROBOT A Downlink 29.357 or 29.403 MHz (CW)

Beacon/ROBOT 29.357 MHz (CW)
Beacon/ROBOT 29.403 MHz (CW)
Mode K Uplink 21.160 - 21.200 MHz (SSB,CW)
Mode K Downlink 29.360 - 29.400 MHz (SSB,CW)
ROBOT K Uplink 21.120 MHz (CW)
ROBOT K Downlink 29.357 or 29.403 MHz (CW)

Beacon/ROBOT 145.857 MHz (CW)
Beacon/ROBOT 145.903 MHz (CW)
Mode T Uplink 21.160 - 21.200 MHz (SSB,CW)

Mode T Downlink 145.860 - 145.900 MHz (SSB,CW)
ROBOT T Uplink 21.120 MHz (CW)
ROBOT T Downlink 145.857 or 145.903 MHz (CW)

Radio Sputnik 11

Beacon/ROBOT 29.407 MHz (CW)
Beacon/ROBOT 29.453 MHz (CW)
Mode A Uplink 145.910 - 145.950 MHz (SSB,CW)
Mode A Downlink 29.410 - 29.450 MHz (SSB,CW)
ROBOT A Uplink 145.830 MHz (CW)
ROBOT A Downlink 29.407 or 29.453 MHz (CW)

Beacon/ROBOT 29.407 MHz (CW)
Beacon/ROBOT 29.453 MHz (CW)
Mode K Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode K Downlink 29.410 - 29.450 MHz (SSB,CW)
ROBOT K Uplink 21.130 MHz (CW)
ROBOT K Downlink 29.407 or 29.453 MHz (CW)

Beacon/ROBOT 145.907 MHz (CW)
Beacon/ROBOT 145.953 MHz (CW)
Mode T Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode T Downlink 145.910 - 145.950 MHz (SSB,CW)
ROBOT T Uplink 21.130 MHz (CW)
ROBOT T Downlink 145.907 or 145.953 MHz (CW)

AMSAT-OSCAR 13

General Beacon 145.812 MHz (PSK,CW,RTTY)
Engineering Beacon 145.985 MHz (PSK,CW,RTTY)
Mode B Uplink 435.423 - 435.573 MHz (SSB,CW)
Mode B Downlink 145.825 - 145.975 MHz (SS,CW,inverting)

General Beacon 435.651 MHz (PSK,RTTY)
Engineering Beacon 435.677 MHz (PSK,RTTY)
Mode L Uplink 1269.351 - 1269.641 MHz (SSB,CW)
Mode L Downlink 435.715 - 436.005 MHz (SSB,CW,inverting)

Mode J Uplink 144.423 - 144.473 MHz (SSB,CW)
Mode J Downlink 435.940 - 435.990 MHz (SSB,CW,inverting)

Beacon 2400.325 MHz (PSK,RTTY)
Beacon 2400.664 MHz (PSK,RTTY)
Mode S Uplink 435.603 - 435.639 MHz (SSB,CW,FM)
Mode S Downlink 2400.711 - 2400.747 MHz (SSB,CW,FM)

RUDAK Uplink 1269.710 MHz (Inoperative)
RUDAK Downlink 435.677 MHz (Inoperative)

UoSAT-OSCAR 14

Uplink 145.975 MHz (FSK/FM)
Downlink 1 435.070 MHz (FSK/FM)

Downlink 2 435.070 MHz (AFSK/FM)

AMSAT-OSCAR 16

Uplinks 145.900, 145.920, 145.940, 145.960 MHz (AFSK/FM)
Downlink (PSK) 437.02625 MHz (BPSK/SSB)
Downlink (RC) 437.05130 MHz (BPSK/SSB)
Downlink S 2401.1428 MHz (BPSK/SSB)

+++Radio Amateur Satellite Frequency Guide (2/2)
--A M S A T--

DOVE-OSCAR 17

Beacon 1 145.82516 MHz (AFSK/FM,Dig voice/FM)
Beacon 2 145.82438 MHz (AFSK/FM,Dig voice/FM)
Beacon S 2401.2205 MHz (BPSK/SSB)

WEBERSAT-OSCAR 18

Downlink (PSK) 437.0751 MHz (BPSK/SSB)
Downlink (RC) 437.1020 MHz (BPSK/SSB)
Uplink ATV (NTSC) 1265.000 MHz (TV/AM)

LUSAT-OSCAR 19

Uplinks 145.840, 145.860, 145.880, 145.900 MHz (AFSK/FM)
Downlink (PSK) 437.15355 MHz (BPSK/SSB)
Downlink (RC) 437.12580 MHz (BPSK/SSB)
CW Beacon 437.125 MHz (CW)

FUJI-OSCAR 20

Beacon 435.795 MHz (CW)
Mode JA Uplink 145.900 - 146.000 MHz (SSB,CW)
Mode JA Downlink 435.800 - 435.900 MHz (SSB,CW,inverting)

Mode JD Uplinks 145.850, 145.870, 145.890, 145.910 MHz (AFSK/FM)
Mode JD Downlink 435.910 MHz (BPSK/SSB)

AMSAT-OSCAR 21

Beacon 145.822 MHz (CW)
Beacon 145.952 MHz (BPSK/FM)
Beacon 145.983 MHz (BPSK/SSB)
Mode B Uplink 1 435.022 - 435.102 MHz (SSB,CW)
Mode B Downlink 1 145.852 - 145.932 MHz (SSB,CW,inverting)
RUDAK 2 Uplink 1 435.016 MHz (AFSK/FM)
RUDAK 2 Uplink 2 435.155 MHz (BPSK/FM)
RUDAK 2 Uplink 3 435.193 MHz (BPSK/FM)
RUDAK 2 Uplink 4 435.041 MHz (Various modes)
RUDAK 2 Downlink 145.983 MHz (Various modes)

Beacon 145.948 MHz (CW)
Beacon 145.838 MHz (BPSK/FM)

Beacon 145.800 MHz (BPSK/FM)
Mode B Uplink 2 435.043 - 435.123 MHz (SSB,CW)
Mode B Downlink 2 145.866 - 145.946 MHz (SSB,CW,inverting)

Radio Sputnik 12

Beacon/ROBOT 29.408 MHz (CW)
Beacon/ROBOT 29.454 MHz (CW)
Mode A Uplink 145.910 - 145.950 MHz (SSB,CW)
Mode A Downlink 29.410 - 29.450 MHz (SSB,CW)
ROBOT A Uplink 145.831 MHz (CW)
ROBOT A Downlink 29.408 or 29.454 MHz (CW)

Beacon/ROBOT 29.408 MHz (CW)
Beacon/ROBOT 29.454 MHz (CW)
Mode K Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode K Downlink 29.410 - 29.450 MHz (SSB,CW)
ROBOT K Uplink 21.129 MHz (CW)
ROBOT K Downlink 29.408 or 29.454 MHz (CW)

Beacon/ROBOT 145.912 MHz (CW)
Beacon/ROBOT 145.959 MHz (CW)
Mode T Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode T Downlink 145.910 - 145.950 MHz (SSB,CW)
ROBOT T Uplink 21.129 MHz (CW)
ROBOT T Downlink 145.912 or 145.959 MHz (CW)

Radio Sputnik 13

Beacon/ROBOT 29.458 MHz (CW)
Beacon/ROBOT 29.504 MHz (CW)
Mode A Uplink 145.960 - 146.000 MHz (SSB,CW)
Mode A Downlink 29.460 - 29.500 MHz (SSB,CW)
ROBOT A Uplink 145.840 MHz (CW)
ROBOT A Downlik 29.458 o 29.504 MHz (CW)

Beacon/ROBOT 29.458 MHz (CW)
Beacon/ROBOT 29.504 MHz (CW)
Mode K Uplink 21.260 - 21.300 MHz (SSB,CW)
Mode K Downlink 29.460 - 29.500 MHz (SSB,CW)
ROBOT K Uplink 21.138 MHz (CW)
ROBOT K Downlink 29.458 or 29.504 MHz (CW)

Beacon/ROBOT 145.862 MHz (CW)
Beacon/ROBOT 145.908 MHz (CW)
Mode T Uplink 21.260 - 21.300 MHz (SSB,CW)
Mode T Downlink 145.960 - 146.000 MHz (SSB,CW)
ROBOT T Uplink 21.138 MHz (CW)
ROBOT T Downlink 145.862 or 145.908 MHz (CW)

OBJECT FREQUENCY (IES)
------ -----------------
SALYUT-7 19.995

SOYUZ 20.008
RS-10/11 29.357 TO 29.510
SOYUZ-TM/3 AND SOYUZ-TM/4 121.750
SOYUZ-T/11 142.423
MIR 143.625
MET-1/30 136.995
SOMETIMES USED BY METEORSATS 137.200
BHASKARA-I 137.230
MET-2/14, MET-2/17, MET-2/18 137.300
BHASKARA-II 137.380
MET-2/12, MET-2/16 137.400
NOAA-10 137.500
NOAA-9 137.620
NOAA-9, NOAA-10 137.770
MET-2/14, MET-3/2 137.850
MET-2/15 137.860
BADR-1 FM AND 1200 BPS FSK 144.028
MIR 145.550
AO-10 General Beacon 145.810
AO-13 General Beacon 145.812
UO-11, BADR-1 145.825
AO-21 CW Beacon 145.948
AO-13 Engineering Beacon 145.985
AO-10 Engineering Beacon, AO-21 145.987
DO-17 TELEMETRY 146.825
TRANSIT / COSNAV CHANNEL 1 149.910
= = = 2 149.940
= = = 3 149.970
HILAT 149.988
TRANSIT / COSNAV CHANNEL 4 150.000
= = = 5 150.030
= = = 1 399.762
= = = 2 399.842
= = = 3 399.922
GEOSAT 400.000
TRANSIT / COSNAV CHANNEL 5 400.200
= = = 5 400.082
1980-052C 432.881
UO-22 435.120
UO-11 435.025
WO-18 PRIMARY - BPSK 435.075
WO-18 SECONDARY - BPSK 435.100
KITSAT-A 435.175
AO-13 General Beacon 435.651
FO-20 435.795
HILAT 435.974
POLAR BEAR 435.9744
AO10, AO13. FO12 ETC. 435.675 TO 437.000
AO-16 437.025 OR 437.050
WO-18 437.075 OR 437.100

SOMETIMES USED BY METEORSATS 461.500
= = = = 464.000
= = = = 466.500
= = = = 468.500
GOES 468.825 TO 468.8375
SOMETIMES USED BY METEORSATS 1000.000
NAVSTAR 1227.600
GLONASS 1250.000
META SKY SEARCH (E T LIFE) 1420.000
NAVSTAR 1575.420
GLONASS 1603.500
GOES 1691.000
METEORSAT 1694.000
NOAA HRPT DATA STREAM (SEE NOTE) 1700.000 (0100-0300 = 1300-1500 Z)
SPOT 2206.000
AO-13 General Beacon 2400.325
UO-11 2401.500
AO13 (S) 2400.640 TO 2400.725
GEOSTAR RO1 / SPACENET 470.000 TO 2508.000
META SKY SEARCH (E T LIFE) 2840.000
TV = C = BAND 3700.000 TO 4200.000
GEOSTAR RO1/SPACENET 5109.000 TO 5141.000
TV = KU = BAND 10700.000 TO 18000.000
LUCH SATELLITES 10975.000 TO 11675.000
SDRN FREQUENCIES 13520.000 TO 15005.000
TV = KA = BAND 20000.000 TO 30000.000
SDRN TO GROUND (?????) 108020.000

==========

--
Mike Ligeza - VE3UIL
Ottawa, Ontario
Canada

9. Re: What's the latest with SEDSAT?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-10 14:34:48 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul10.143448.14158@ke4zv.uucp>
Source record: 28668

In article <1993Jul1.200518.3376@mnemosyne.cs.du.edu> lkollar@nyx.cs.du.edu (Larry Kollar) writes:
>I remember reading something on the nets last year about some students at
>Alabama-Huntsville building a ham satellite called SEDSAT. Last I heard,
>SEDSAT would have a Mode A data transponder and be launched off the SEDS
>(Space Shuttle tether that worked so miserably the first time) some time
>next year.
>
>Anyone have more to add? Are the culprits (oops, "principles") on the Net?

You'll find Dennis Wingo lurking over on Sci.space.

Gary

--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

10. Re: ATV

Newsgroup: rec.radio.amateur.space
Date: 1993-07-10 14:43:20 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul10.144320.14381@ke4zv.uucp>
Source record: 28669

In article <1993Jul03.171558.17301@dcc.uchile.cl> ereimber@dcc.uchile.cl (Reimberg Navarro Erich Eduardo) writes:
>Hi.
>
> I've heard a lot about ATV in this group. I guess it's a TV
>system for satellites, or something like that. I'd like to
>have some other information about this, ie, how can you receive?
>How much are the equipment for it? etc...
>
> Thanks in advance, Erich

ATV is Amateur TeleVision. Normally the usage means AM NTSC, or PAL, fast scan TV used over regular terrestrial links, no amateur satellite has yet included ATV capability. The Webersat does have a camera, but it is used to grab single frames that can be downloaded via it's digital link and viewed on a computer.

ATV transmitters are relatively cheap at around $200-400, and ordinary cable TV converters can be used to receive the common 70 cm transmissions. There is also wideband FM TV equipment available for the 902 and 1296 MHz bands. The FM stuff works better, but you can't just use a cable TV box to receive it.

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

11. Re: ATV

Newsgroup: rec.radio.amateur.space
Date: 1993-07-11 15:13:01 UTC
From: gerry@cs.tamu.edu
Message-ID: <21palt$378@tamsun.tamu.edu>
Source record: 28670

In article <1993Jul10.144320.14381@ke4zv.uucp> gary@ke4zv.UUCP (Gary Coffman) writes:
->In article <1993Jul03.171558.17301@dcc.uchile.cl> ereimber@dcc.uchile.cl (Reimberg Navarro Erich Eduardo) writes:
->->Hi.
->->
->-> I've heard a lot about ATV in this group. I guess it's a TV
->->system for satellites, or something like that. I'd like to
->->have some other information about this, ie, how can you receive?
->->How much are the equipment for it? etc...
->->
->-> Thanks in advance, Erich
->
->ATV is Amateur TeleVision. Normally the usage means AM NTSC, or PAL,
->fast scan TV used over regular terrestrial links, no amateur satellite
->has yet included ATV capability. The Webersat does have a camera, but
->it is used to grab single frames that can be downloaded via it's digital
->link and viewed on a computer.
->
->ATV transmitters are relatively cheap at around $200-400, and ordinary
->cable TV converters can be used to receive the common 70 cm transmissions.
->There is also wideband FM TV equipment available for the 902 and 1296
->MHz bands. The FM stuff works better, but you can't just use a cable
->TV box to receive it.

SAREX (Shuttle Amateur Radio Experiment) has also experimented with AV activities. We've flown 3 missions now with ATV reception capabilities. We have 6 stations with STA's for ATV operation, with significant power, in the Satellite subband on 70 cm for this test. All 3 missions, STS-37, STS-50 and STS-56, had some degree of success, with STS-56 being, in my estimation, the most successful, when KB5AWP, aboard the Orbiter, started saying things like, "Sam, wave your hand. Now tell the Flight Director to wave. *I CAN SEE YOU GUYS*." The JSC ARC was sending NASA Select video up to the crew on ATV, letting the crew see what the guys playing flight controller were doing! It was pretty neat. We've sent a crew-requested, non-commercial evening variety show monologue up, and a BUNCH of shots of the launch. As Gary said, in this case, it's all NTSC.

Because of limitations on antennas and power, downlink on ATV is unlikely in the near future. Doesn't mean SAREX won't come back and look at it. Just that we don't see how we can get away with it now.

73, gerry creager n5jxs

12. Re: ATV

Newsgroup: rec.radio.amateur.space
Date: 1993-07-12 12:37:08 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul12.123708.22622@ke4zv.uucp>
Source record: 28671

In article <21palt$378@tamsun.tamu.edu> gerry@cs.tamu.edu (Gerald J Creager) writes:
>
>SAREX (Shuttle Amateur Radio Experiment) has also experimented with AV
>activities. We've flown 3 missions now with ATV reception capabilities. We
>have 6 stations with STA's for ATV operation, with significant power, in the
^^^^^^^^^^^^^^^^^
How significant?

>Because of limitations on antennas and power, downlink on ATV is unlikely in
>the near future. Doesn't mean SAREX won't come back and look at it. Just
>that we don't see how we can get away with it now.

50 watts wideband FM at S band should work. At the 5 watt level, it's
probably a lost cause for all but the best equipped receive sites.

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

13. RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-12 15:56:00 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <21s1ig$6uk@pith.uoregon.edu>
Source record: 28672

Can someone confirm the status of RS12/13 for me, I am hearing the beacon
at 29.408 well but can't get a signal thru the translator with a 2mtr
uplink. Is mode A turned off at this time?
Thanks,
--
Jeff Hite KF7SZ
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

14. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-12 17:07:24 UTC
From: sford@arrl.org
Message-ID: <1707@arrl.org>
Source record: 28673

In rec.radio.amateur.space, jeffh@ludwig.cc.uoregon.edu (Jeff Hite) writes:
>Can someone confirm the status of RS12/13 for me, I am hearing the beacon
>at 29.408 well but can't get a signal thru the translator with a 2mtr
>uplink. Is mode A turned off at this time?
>Thanks,
>--
>Jeff Hite KF7SZ
>Computing Center
>U of Oregon
>jeffh@ludwig.cc.uoregon.edu
>

RS-12/13 has been operating in Mode K for some time. The ground
control facility is grossly short of funds and they've opted to
leave it this way for the immediate future.

The Mode K uplink passband is: 21.210--21.250 MHz
downlink passband is: 29.410--29.450 MHz

73...Steve, WB8IMY
ARRL

15. APT-Satellites: Report JULY 11, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-13 07:21:00 UTC
From: peter.henne@gmd.de
Message-ID: <1993Jul13.072100.2285@gmd.de>
Source record: 28675
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, JULY 11, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 On

NOAA-10 is close to NOAA-12 and thus switched off to
avoid VHF-conflicts.
The last report was dated JUNE 03 but reported JULY 03.
I apologize for this error.
```


```
+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

16. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-13 15:00:58 UTC
From: dts@banyan.com
Message-ID: <CA3z1n.IEA@squam.banyan.com>
Source record: 28676

I think that RS-10/11 is normally in the mode you want, 2 up, 10 down.

RS-12/13 is in the mode with 15 meters up/ 10 down, normally. I don't know if
they can be configured for both at the same time...

Dan
--

Daniel Senie Internet: dts@questar.banyan.com
Banyan Systems, Inc. Compuserve: 74176,1347
508-898-1188 Packet Radio: N1JEB@KA1SRD.MA

17. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-13 17:27:13 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <21ur9h$ia5@pith.uoregon.edu>
Source record: 28677

Thanks to all for the e-mail and posts concerning RS 12/13...apparently it is in mode K for the foreseeable future. No wonder it's so quiet on passes, I don't think most folks have 2 HF rigs to work it. Also most of the mode K uplink is in the extra portion of the 15m band.

--

Jeff Hite KF7SZ
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

18. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-13 20:06:21 UTC
From: mckee@fc.hp.com
Message-ID: <CA4D6L.H1@fc.hp.com>
Source record: 28678

Jeff Hite (jeffh@ludwig.cc.uoregon.edu) wrote:
: Thanks to all for the e-mail and posts concerning RS 12/13...apparently it
: is in mode K for the foreseeable future. No wonder it's so quiet on
: passes, I don't think most folks have 2 HF rigs to work it. Also most of
: the mode K uplink is in the extra portion of the 15m band.

Actually most new HF rigs can work fine. I use mine spit 15 up, 10 down.
I pick a spot to try before the pass and tune them both so that they should
be "at the same place". Then I listen on the downlink, do as litte fine tuning
as possible, quickly revers the split and tune the uplink, reverse again
and call. So far I have gotten contancts about 75% of the time using just
my parallel dipole and 100 watts.

Hope to catch you there,

73
Bret N0MTA

19. Re: Contructional details for 2m helical

Newsgroup: rec.radio.amateur.space
Date: 1993-07-14 14:30:02 UTC
From: dbraun@ilx049.intel.com
Message-ID: <22159a$2ol9@ilx018.intel.com>
Source record: 28682
Cross-posted to: rec.radio.amateur.antenna,rec.radio.amateur.space

In article <1993Jul9.213025.4213@mnemosyne.cs.du.edu>, smace@nyx.cs.du.edu (Scott Mace) writes:
|> I'm trying to build a huge 6 turn helical antenna for the 137mhz to
|> 138mhz weather sat band. I've made a prototype out of 1x1 pine frame
|> with no. 8 wire for the helix, and a reflector screen made from
|> a few large peices of heavy duty screen.

Does one really need such a fancy antenna go get wesats?
I notice a get a decent signal (well, to the ear) from
a scanner with its built-in whip antenna indoors.

Also, generally speaking, can't you receive CP transmissions
OK with an ordinary antenna (apart from the 3db power loss?)
I would assume that there would not be too much multipath
from a satellite.

But then, this thing would look impressive up on the roof...

--
Doug Braun (N1OWU)

Email: dbraun@iil.intel.com
Intel Mail: IDC1-41
iNet: 8-435-5069 Long Distance: 011-972-4-655069
Fax: 8-435-5999 Long Distance: 011-972-4-655999
Snail Mail: US: Other:
PO Box 311 Intel Israel, Ltd.
Mendham, NJ 07945 IDC1-41
Matam Scientific Center
Haifa, Israel 31015

"There is no human problem which could not be solved if
people would simply do as I advise." -- Gore Vidal

20. Re: ATV

Newsgroup: rec.radio.amateur.space
Date: 1993-07-14 14:42:52 UTC
From: gerry@cs.tamu.edu
Message-ID: <22161c$bol@tamsun.tamu.edu>
Source record: 28679

In article <1993Jul12.123708.22622@ke4zv.uucp> gary@ke4zv.UUCP (Gary Coffman) writes:
-In article <21palt$378@tamsun.tamu.edu> gerry@cs.tamu.edu (Gerald J Creager) writes:
--
--SAREX (Shuttle Amateur Radio Experiment) has also experimented with AV
--activities. We've flown 3 missions now with ATV reception capabilities. We
--have 6 stations with STA's for ATV operation, with significant power, in the
- ^^^^^^^^^^^^^^^^
-How significant?

The typical station has been running 800-1000 watts. EIRP has been on the
order of 25000 watts, if memory serves me. Some of the sites are in the
400-600 watt range. Typical antenna gains are 14-23 dB.

--Because of limitations on antennas and power, downlink on ATV is unlikely in
--the near future. Doesn't mean SAREX won't come back and look at it. Just
--that we don't see how we can get away with it now.
-
-50 watts wideband FM at S band should work. At the 5 watt level, it's
-probably a lost cause for all but the best equipped receive sites.

Gee.... I thought we did not have earth-to-space priveleges on S-band. I
know it sounds like an excuse, but the engineering development costs
associated with adding a new piece of hardware to the Shuttle manifest is
prohibitive, for a volunteer project, both in terms dollar amounts, and
personnel, is prohibitive. Then the paperwork associated with adding an RF
radiating device to the Orbiter is prohibitive... And, 50 watts FM at S-band
is going to require some significant (from a Shuttle persoective) input DC
power, something EGIL is never willing to give up gracefully...

I think you'll see a few more advancements in the state of the SAREX art over
the years, but because of the rules we have to follow, it's not always readily
apparent, nor real swift in its movement.

73,
gerry n5jxs

21. Sarex stuff (was Re: ATV)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-14 15:22:23 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <2218bfINNd8o@newsstand.cit.cornell.edu>
Source record: 28680

In article <22161c$bol@tamsun.tamu.edu> Gerald J Creager,
gerry@cs.tamu.edu writes:
>
>I think you'll see a few more advancements in the state of the SAREX art
over
>the years, but because of the rules we have to follow, it's not always
readily
>apparent, nor real swift in its movement.
>
>73,
>gerry n5jxs

Which makes me curious about something else - the shuttle SAREX antennas. Our radio club was involved with the Trumansburg Middle School in working STS-55 this spring (I was the op at the school) and on our first attempt via telebridge, the shuttle was really rough using the window antenna. We managed to exchange callsigns but that was about it. The second try I guess they pulled the cable right out of the N connector - we never heard them. (I heard that they were on NASA select video apologizing at the time - wish I had a tape of that) But the third time, using the German SAFEX antenna worked like a charm - very good signals via Hawaii. Is there any movement afoot to change over to an antenna more like the SAFEX whip than the window mount currently in use? I've copied the shuttle on most of the high orbit missions (we're up at 43N lat) and caught packet bursts even on the 28 degree missions - but the antenna always seems to be the limiting factor. I know one doesn't lightly tack an extra quarter wave whip on the outside of a mach 25 orbiter (a little different from duck taping things to the bottom of the old Cessna) - but any chance of getting something that sticks up out of the cargo bay?

BTW - we were really impressed by the shuttle crew going out of their way to make a third opportunity for a sucessful contact.

Any other interesting tidbits about SAREX missions? Any more SSTV transmissions planned soon? (just got my Pasokon board :-)

Kevin, WB2EMS (fkf1@cornell.edu)

22. Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-14 20:28:14 UTC
From: lkollar@nyx.cs.du.edu
Message-ID: <1993Jul14.202814.15457@mnemosyne.cs.du.edu>
Source record: 28681

On RS-10, keying the push-to-talk button on an FM rig (in a quiet room or with the mike against my leg) would produce a watery-sounding but copyable CW signal on the downlink. I actually got a response out of the CW Robot once.

I haven't tried it since I got the all-mode, but I was wondering if anyone has tried it on AO-13 with a 70cm FM rig. Would the response be:

a) "RST 347" or something other than "9" in the third digit?

b) "UR SIG TOO WIDE BT GET FM RIG OFF UPLINK"

c) Hordes of angry ops coming to my shack to insert the rig, antennas, and anything laying around loose into my anatomy?

I kind of expect the response would be a) since I've heard similar signals on RS-10 and they didn't seem to be extraordinarily wide. I just wondered if anyone has tried it and if it's considered Bad Form.

I'm hoping I'll find a good deal on a 70 cm all-mode at the Atlanta Hamfest this weekend and I won't have to try it. (Gary, will I see you there???)

Low-budget as always. :-)
--
Larry Kollar, KC4WZK | 'finger lkollar' for ham-related interests.
lkollar@nyx.cs.du.edu | "Didn't vote for the lottery - won't play it."
"[The media] tore down Bush, now they're trying to tear down Clinton.
Are they trying to destroy the presidency?" - Barry Goldwater

23. Re: Sarex stuff (was Re: ATV)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 12:58:17 UTC
From: gerry@cs.tamu.edu
Message-ID: <223k99$h6h@tamsun.tamu.edu>
Source record: 28683

In article <2218bfINNd8o@newsstand.cit.cornell.edu> F. Kevin Feeney <fkf1@cornell.edu> writes:
>
>Which makes me curious about something else - the shuttle SAREX antennas.
>Our radio club was involved with the Trumansburg Middle School in working
>STS-55 this spring (I was the op at the school) and on our first attempt
>via telebridge, the shuttle was really rough using the window antenna. We
>managed to exchange callsigns but that was about it. The second try I
>guess they pulled the cable right out of the N connector - we never heard
>them. (I heard that they were on NASA select video apologizing at the
>time - wish I had a tape of that) But the third time, using the German
>SAFEX antenna worked like a charm - very good signals via Hawaii. Is
>there any movement afoot to change over to an antenna more like the SAFEX
>whip than the window mount currently in use? I've copied the shuttle on
>most of the high orbit missions (we're up at 43N lat) and caught packet
>bursts even on the 28 degree missions - but the antenna always seems to
>be the limiting factor. I know one doesn't lightly tack an extra quarter
>wave whip on the outside of a mach 25 orbiter (a little different from
>duck taping things to the bottom of the old Cessna) - but any chance of
>getting something that sticks up out of the cargo bay?

the best thing I can tell you right now is, "We're woring on that." I don't really want to say more, and risk raising false expectations, but, there are some investigations in the mill for antennas external to the vehicle, probably in the payload bay.

>BTW - we were really impressed by the shuttle crew going out of their way
>to make a third opportunity for a sucessful contact.

I just talked to the STS-57 crew. I got some more insight into their (actually, Ron Grabe's refusal to pull out the SAREX gear, and it was as I expected: Getting back into SpaceHab was non-trivial. Hopefully, we will be stowed inthe middeck in the future, where we can be more easily deployed and stowed, but if it's a tradeoff between being stowed in SpaceHab or not flying...

>Any other interesting tidbits about SAREX missions? Any more SSTV
>transmissions planned soon? (just got my Pasokon board :-)

I don't recall the manifests for the next couple of missions, and we're not heavily manifested (so far...) for next year, although that will change. I don't expect to see the SSTV gear fly again this year, due to space constraints (the STS-58 Commander (!) gave up his personal preference kit to carry SAREX there) and training constraints (language barriers :-) on STS-60... I'm sure it will fly again, probably early next year. I've gotten a number of positive comments from the crews about all aspects of SAREX,

including a few comments about the fun involved on a wave-off day of pulling the radio out and talking to folks! Based on that, expect to see some more of that, at least.

Also, STS-58 now has 4 licensed hams, and ALL of 'em like to talk. With the Extended Duration Orbiter mission, 3 hams, and single shift activities, I expect to see a lot of voice ops when SOMEONE is available, and packet ops at "night" when everyone's asleep. This crew has told us that is their intent. Inflight anomalies are wildcards, however...

Oh, and thanks for the help with Trumansburg.

73, gerry n5jxs

24. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 13:32:09 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-742743120@unomaha.edu>
Source record: 28684
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

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Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
```

arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
==========

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

25. Re: Sarex stuff (was Re: ATV)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 16:08:33 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <223ve1INNcf7@newsstand.cit.cornell.edu>
Source record: 28685

In article <223k99$h6h@tamsun.tamu.edu> Gerald J Creager,
gerry@cs.tamu.edu writes:
>the best thing I can tell you right now is, "We're woring on that." I
don't
>really want to say more, and risk raising false expectations, but, there
are
>some investigations in the mill for antennas external to the vehicle,
probably
>in the payload bay.
>

Well I hope that works out well, and soon! Based on the comparison of signals between SAREX and SAFEX antennas, and also between the SAREX and MIR, some sort of outside antenna will make a lot of difference. How did the signal comparison on orbits 61/62 work out? We weren't in the right footprint to participate in that (you guys need more high inclination orbits! :-) but I heard things like the SAFEX antenna was 10 db or more better than the window mount. (BTW, do you know what MIR uses, and how they mounted it?)

>I don't recall the manifests for the next couple of missions, and we're
not
>heavily manifested (so far...) for next year, although that will change.
I
>don't expect to see the SSTV gear fly again this year, due to space
>constraints (the STS-58 Commander (!) gave up his personal preference
kit to
>carry SAREX there) and training constraints (language barriers :-) on
>STS-60... I'm sure it will fly again, probably early next year. I've
gotten
>a number of positive comments from the crews about all aspects of SAREX,
>including a few comments about the fun involved on a wave-off day of
pulling
>the radio out and talking to folks! Based on that, expect to see some
more of
>that, at least.

Yeah, I imagine on a wave off day that having something 'fun' to do would be a nice break in the routine. The packet robot is nice for when the crews can't spend time with the system - and will probably be my best chance of working them direct some day.

Hmmm, giving up your personal space - that's dedication.

>
>Also, STS-58 now has 4 licensed hams, and ALL of 'em like to talk. With

the
>Extended Duration Orbiter mission, 3 hams, and single shift activities, I
>expect to see a lot of voice ops when SOMEONE is available, and packet
ops at
>"night" when everyone's asleep. This crew has told us that is their
intent.
>Inflight anomalies are wildcards, however...

Yeah, Murphy always gets in his licks...
>
>Oh, and thanks for the help with Trumansburg.
>

MY pleasure. I think we were as excited as the kids, maybe more so. For them, this stuff is not so special - they've grown up with it. I remember watching Shepard get launched, and watching Apollo touch down. For us, talking to someone is space is not something that 'always was happening'. Lots of grins in T-burg when that went off. :-) (now, do I qualify for a QSL? Or does AT&T get that for the telebridge...? :-) Also, we've been meaning to sit down and put together some video of our end - would you be interested in a copy of that when we get it done? Our way of saying thanks to the crew for going the extra mile, and all the ground support staff?

Kevin, WB2EMS (fkf1@cornell.edu)

26. Re: Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 16:15:38 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <223vraINNcf7@newsstand.cit.cornell.edu>
Source record: 28686

In article <1993Jul14.202814.15457@mnemosyne.cs.du.edu> Larry Kollar, lkollar@nyx.cs.du.edu writes:
>On RS-10, keying the push-to-talk button on an FM rig (in a quiet room or with
>the mike against my leg) would produce a watery-sounding but copyable CW
>signal on the downlink. I actually got a response out of the CW Robot once.
>
>I haven't tried it since I got the all-mode, but I was wondering if anyone
>has tried it on AO-13 with a 70cm FM rig. Would the response be:
>
> a) "RST 347" or something other than "9" in the third digit?
>
> b) "UR SIG TOO WIDE BT GET FM RIG OFF UPLINK"
>
> c) Hordes of angry ops coming to my shack to insert the rig, antennas,
> and anything laying around loose into my anatomy?
>
>I kind of expect the response would be a) since I've heard similar signals on
>RS-10 and they didn't seem to be extraordinarily wide. I just wondered if
>anyone has tried it and if it's considered Bad Form.
>

I've done it a couple of times for grins and giggles to see if I could copy a real low power signal back through AO13 - using an IC32AT and a 14 turn helix antenna I've copied myself pretty solid on 5 watts, and could read the call back on 1 watt! The signal was pretty wobbly, but not really wide - certainly not as wide as a voice SSB signal, and no where near as wide as a regular FM signal (as long as you don't make any noise - I inserted a jumpered plug into me mic input to short out any audio, but it still wobbles a little. Looking for a way to steady that up) The biggest problem was the chirp. I think the thing to do is use the FM rig as a signal source, and then add a power amp after that and key the PA. Haven't gotten around to trying that yet - but a 10 watt PA keyed by a husky transistor with a little shaping would probably work.

Anyway I'd expect a) and not b) or c). At least if you short out the audio input. I'd be curious as to what you come up with.

Kevin, WB2EMS (fkf1@cornell.edu)

27. Re: Sarex stuff (was Re: ATV)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 18:19:29 UTC
From: ollie@eudaemon.West.Sun.COM
Message-ID: <22473hINN9j8@west.West.Sun.COM>
Source record: 28687

As far as I know, Mir uses a 2m whip antenna attached to the outside of the station. I remember a space walk a few years back where a brave cosmonaut extended his spacewalk to install the antenna. Anyone have more info?

Ollie

28. Re: ATV

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 19:16:07 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul15.191607.8482@ke4zv.uucp>
Source record: 28690

In article <22161c$bol@tamsun.tamu.edu> gerry@cs.tamu.edu (Gerald J Creager) writes:
>In article <1993Jul12.123708.22622@ke4zv.uucp> gary@ke4zv.UUCP (Gary Coffman) writes:
>-In article <21palt$378@tamsun.tamu.edu> gerry@cs.tamu.edu (Gerald J Creager) writes:
>
>--Because of limitations on antennas and power, downlink on ATV is unlikely in
^^^^^^^^^^^^^^^
>--the near future. Doesn't mean SAREX won't come back and look at it. Just
>--that we don't see how we can get away with it now.
>-
>-50 watts wideband FM at S band should work. At the 5 watt level, it's
>-probably a lost cause for all but the best equipped receive sites.
>
>Gee.... I thought we did not have earth-to-space priveleges on S-band. I

Sure, but as you said, *downlink*, not uplink.

>know it sounds like an excuse, but the engineering development costs
>associated with adding a new piece of hardware to the Shuttle manifest is
>prohibitive, for a volunteer project, both in terms dollar amounts, and
>personnel, is prohibitive. Then the paperwork associated with adding an RF
>radiating device to the Orbiter is prohibitive... And, 50 watts FM at S-band
>is going to require some significant (from a Shuttle persoective) input DC
>power, something EGIL is never willing to give up gracefully...

50 watts is probably out of the question due to power limitations from
the Orbiter. 5 watts is possible since that's what the current equipment
uses, but it's understandable that the development of such equipment
might not be worthwhile considering the major requirements for the
receive station at that power level. The Earth station would need
something like a 10 foot dish capable of tracking the Shuttle. That's
considerably more effort than is required for current SAREX receive
stations, but not more than required for the current ATV *uplink*
stations.

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

29. Re: Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 19:24:22 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul15.192422.8562@ke4zv.uucp>
Source record: 28691

In article <1993Jul14.202814.15457@mnemosyne.cs.du.edu> lkollar@nyx.cs.du.edu (Larry Kollar) writes:
>On RS-10, keying the push-to-talk button on an FM rig (in a quiet room or with
>the mike against my leg) would produce a watery-sounding but copyable CW
>signal on the downlink. I actually got a response out of the CW Robot once.
>
>I haven't tried it since I got the all-mode, but I was wondering if anyone
>has tried it on AO-13 with a 70cm FM rig. Would the response be:
>
> a) "RST 347" or something other than "9" in the third digit?
> b) "UR SIG TOO WIDE BT GET FM RIG OFF UPLINK"
> c) Hordes of angry ops coming to my shack to insert the rig, antennas,
> and anything laying around loose into my anatomy?
>
>I kind of expect the response would be a) since I've heard similar signals on
>RS-10 and they didn't seem to be extraordinarily wide. I just wondered if
>anyone has tried it and if it's considered Bad Form.

You can send decent *slow* CW with an FM rig. Disconnect the mike and
hook the key to the PTT connection to avoid incidental FM modulation.
Oh, and don't forget to turn off the PL! The main problem you have is
that most FM rigs don't TR quickly, so your CW speed is limited. Not
a problem with me. :-) If you want faster speed, you can go inside
and key the buffer stage while leaving the PTT closed.

>I'm hoping I'll find a good deal on a 70 cm all-mode at the Atlanta Hamfest
>this weekend and I won't have to try it. (Gary, will I see you there???)

I'll be the fellow peddling Jurrasic computer junk!

Gary

--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

30. Re: Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 20:30:22 UTC
From: lkollar@nyx.cs.du.edu
Message-ID: <1993Jul15.203022.6920@mnemosyne.cs.du.edu>
Source record: 28688

F. Kevin Feeney <fkf1@cornell.edu> writes in response to my question about keying an FM rig:

>I've done it a couple of times for grins and giggles to see if I could
>copy a real low power signal back through AO13 - using an IC32AT and a 14
>turn helix antenna I've copied myself pretty solid on 5 watts, and could
>read the call back on 1 watt! The signal was pretty wobbly, but not
>really wide [... el muncho ...]

Solid on 5 watts! Not bad! This is the kind of info I was hoping to get. I heard the wobble too when I tried it with RS-10. Someone once said that was phase noise (from the freq. synthesizer if I remember right).

>- I inserted a jumpered plug into me mic input to short out any audio,
>but it still wobbles a little. Looking for a way to steady that up)

I figured to just pull the mike completely and hook my CW keyer across the PTT and ground leads. I suspect it won't all go away no matter what.

> I think the thing to do is use the FM rig
>as a signal source, and then add a power amp after that and key the PA.
>Haven't gotten around to trying that yet - but a 10 watt PA keyed by a
>husky transistor with a little shaping would probably work.

Interesting thought. I still think the "wobble" would remain, but it might cure the chirps. Then again, if you're going through enough trouble to hack or build a PA, you could probably slip a little shaping into the PTT circuit of the rig.

This ought to be interesting. I'm still drawing up plans for a proper CW transmitter, but why wait if I have to? :-)

Atlanta Hamfest 40.5 hours and counting.

--
Larry Kollar, KC4WZK | 'finger lkollar' for ham-related interests.
lkollar@nyx.cs.du.edu | "Didn't vote for the lottery - won't play it."
"[The media] tore down Bush, now they're trying to tear down Clinton.
Are they trying to destroy the presidency?" - Barry Goldwater

31. Re: Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 22:02:49 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <224k69INNjat@newsstand.cit.cornell.edu>
Source record: 28692

In article <1993Jul15.203022.6920@mnemosyne.cs.du.edu> Larry Kollar, lkollar@nyx.cs.du.edu writes:
>Solid on 5 watts! Not bad! This is the kind of info I was hoping to get.
>I heard the wobble too when I tried it with RS-10. Someone once said that
>was phase noise (from the freq. synthesizer if I remember right).

With a 15 db gain antenna, and a receive station capable of copying Z8 in the ZRO contest. But yeah, 5 watts was easy to copy.

>
>>- I inserted a jumpered plug into me mic input to short out any audio,
>>but it still wobbles a little. Looking for a way to steady that up)
>
>I figured to just pull the mike completely and hook my CW keyer across
>the PTT and ground leads. I suspect it won't all go away no matter what.

I agree, it is at least a little phase noise - but you want to make sure you aren't contributing any FM up the audio chain. The chirp is worse than the wobble.
>
>> I think the thing to do is use the FM rig
>>as a signal source, and then add a power amp after that and key the PA.
>>Haven't gotten around to trying that yet - but a 10 watt PA keyed by a
>>husky transistor with a little shaping would probably work.
>
>Interesting thought. I still think the "wobble" would remain, but it might
>cure the chirps. Then again, if you're going through enough trouble to hack
>or build a PA, you could probably slip a little shaping into the PTT circuit
>of the rig.

Agreed, the wobble won't get any better, but you can leave the 'exciter' keyed to get rid of the chirp and just key the PA. I've been thinking about it for possibilities for a really portable satellite CW rig.
>
>This ought to be interesting. I'm still drawing up plans for a proper CW
>transmitter, but why wait if I have to? :-)

Exactly, I first played with the satellites in 1976 using a 2 meter HT, a 40 watt amp, and a heath SB301 - Oscar 7 or 8 i believe running mode A. The cw note was bloody awful and I never made a QSO, but I did hear my own call coming back down.

I think this wouldn't be real popular if it got to be real widespread, but a little experimenting shouldn't hurt. It doesn't sound real nice, but it's not real wide or causing anyone any troubles. 537 maybe. Let me know how you make out, maybe we can have an HT
qso. :-)

Kevin, WB2EMS (fkf1@cornell.edu)

32. Re: What's the latest with SEDSAT?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-15 23:13:48 UTC
From: higgins@fnalf.fnal.gov
Message-ID: <1993Jul15.171348.1@fnalf.fnal.gov>
Source record: 28689

In article <1993Jul10.143448.14158@ke4zv.uucp>, gary@ke4zv.uucp (Gary Coffman) writes:
> In article <1993Jul1.200518.3376@mnemosyne.cs.du.edu> lkollar@nyx.cs.du.edu (Larry Kollar) writes:
>>I remember reading something on the nets last year about some students at
>>Alabama-Huntsville building a ham satellite called SEDSAT. Last I heard,
>>SEDSAT would have a Mode A data transponder and be launched off the SEDS
>>(Space Shuttle tether that worked so miserably the first time) some time
>>next year.
>>
>>Anyone have more to add? Are the culprits (oops, "principles") on the Net?
>
> You'll find Dennis Wingo lurking over on Sci.space.

Yup. One address for him is wingo%7977.span@FEDEX.MSFC.NASA.GOV.

I recently visited the UaH lab where SEDSAT is under construction.
It's an exciting project and will, among other things, boost the orbit
of the spacecraft using a tether. It will carry CCD imagers and
employ on-board image processing.

The most recent status report I've seen is from February 1993. I'll
post it; possibly Dennis or another UaH person can follow up with a
better update. Since that time NASA's SEDS (Small Expendable Deployer
System) has flown and proven out some of the tether hardware SEDSAT
will be using.

Note that the status report includes a plea for money. I think it's a
worthwhile project.

--
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- ~ -~~~~~~~~~~~/_) / / / / / / (_) (_) / / / _\~~~~~~~~~~~zap!
/ \ (_) (_) / | \
| | Bill Higgins Fermi National Accelerator Laboratory
\ / Bitnet: HIGGINS@FNAL.BITNET
- - Internet: HIGGINS@FNAL.FNAL.GOV
~ SPAN/Hepnet: 43011::HIGGINS
======
Date: Sun, 14 Feb 1993 21:22:13 CST
From: wingo%7977.span@FEDEX.MSFC.NASA.GOV
Subject: Short SEDSAT 1 update

Here is a short update on our recent SEDSAT 1 activities.

We met on January 30, 1993 with our sponsors at the Marshall Space Flight
Center. We gave a status review of our program including financial

information. We are ahead of schedule in some things and behind schedule in others. Most of our behind schedule items is due to cash shortages, which are starting to affect our progress again. Consider this an offical accounting of the funding that we have to date.

In Kind contributions

Total of $536,000 from over ten sources

Cash Contributions

Total of $90,600 dollars in four years

Just as a note when we sent out a call for help in funds last year we had three donations totalling $340 dollars. The three who donated will have their names engraved on the satellite as sponsors when we launch the satellite.

We need a minimum of another $97,000 dollars to finish the satellite. Yes folks this is what we need. We also are still looking for soem (some) in kind donations as well. Any SEDS member (or anyone else for that matter that donates a minimum of 70 U.S. Dollars will get their name engraved on one of the inside facets of our satellite. This hopefully will be an incentive for some of you to donate. This donation can also come from a chapter, and will be engraved in the chapter's name. Anyone interested? Please send money to the following address.

SEDSAT 1 Project c/o Dennis Wingo
University of Alabama in Huntsville
Research Institute Room M65
Huntsville Alabama, 35899

You will receive written confirmation of your donation. For Donations of over $150 dollars we will also send out a Certificate of participation as a SEDSAT 1 team member. For Donations of over $250 dollars you will also get a SEDSAT 1 Team member Tee Shirt when they come out. You may distribute this to your NSS member friends and to any others who may be interested in supporting our project. Irwin would you also post this to sci.space?

We are no being firmly scheduled for a March 1994 launch on a Delta II as a secondary payload to an Air Force GPS satellite. The only things that will keep this from happening is a failure of the tether system or a LACK OF FUNDING that keeps us from getting our job done. It is unfortunate that at this time we are having to dedicate our full time efforts to doing work that we can do and little to fund raising. We will have to reverse this is something does not happen soon.

We only need 400 people to donate $250 dollars to make this happen. If you cannot and (your parents cannot) then maybe think about going to local businesses and telling them about us and what we are doing. If you need information about SEDSAT then I will post our summary as I have a c couple of times before.

We have come farther than I have hoped. We had a meeting with the director of the Marshall Space Flight Center last week and now EVERYONE has agreed that our payload is the one to fly on the second SEDS mission. The only condition is that we produce a satellite to fly. We have recently as two weeks ago acquired two of the five solar arrays that we need to go on the satellite. Right now the Flight structure of the satellite is being fabricated at Boeing Defense and Space. The flight cameras are about to be ordered and the antennas have been tested. We have seven students getting credit working on the satellite this quarter in addition to all of our volunteers.
[...]

Ad Astra Per Ardua
Dennis, University of Alabama in Huntsville

33. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 00:33:13 UTC
From: greg@core.rose.hp.com
Message-ID: <CA8EvD.EDr@icon.rose.hp.com>
Source record: 28693

Bret McKee (mckee@fc.hp.com) wrote:
: Actually most new HF rigs can work fine. I use mine spit 15 up, 10 down.
: I pick a spot to try before the pass and tune them both so that they should
: be "at the same place". Then I listen on the downlink, do as litte fine tuning
: as possible, quickly revers the split and tune the uplink, reverse again
: and call. So far I have gotten contancts about 75% of the time using just
: my parallel dipole and 100 watts.

How do you work the doppler shift if you can't hear yourself on the downlink while you're talking on the uplink? I work RS-10 all the time, but it takes me 2 radios, even though one of them can do both links (just not at the same time).

I'd dearly like to ditch the Radio Shack shortwave receiver I've been using for the downlink, and convince the Yaesu FT-767GX that it can do both.

Greg KD6KGW.

34. Re: Keying FM rig for CW on uplink(?)

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 12:37:40 UTC
From: stephens@geod.emr.ca
Message-ID: <stephens.742826260@ngis>
Source record: 28694

lkollar@nyx.cs.du.edu (Larry Kollar) writes:

>>I've done it a couple of times for grins and giggles to see if I could
>>copy a real low power signal back through AO13 - using an IC32AT and a 14
>>turn helix antenna I've copied myself pretty solid on 5 watts, and could
>>read the call back on 1 watt! The signal was pretty wobbly, but not
>>really wide [... el muncho ...]

>Solid on 5 watts! Not bad! This is the kind of info I was hoping to get.
>I heard the wobble too when I tried it with RS-10. Someone once said that
>was phase noise (from the freq. synthesizer if I remember right).

I use 10 watts uplink to AO-13 and a Cushcraft AOP-1 antenna on a
regular basis. That is cw from a 2m all mode and a Microwave
modules transvertor. I have had the occasional SSB qso. The secret
is short cables. I literally sit in a basement just below the antenna,
and is very dependent on the orientation of the satellite and if it
is low and on omnis or high and on main antenna. Usual reprot is 549.
So if you aare hunting flea markets look out for 2m or 10 m to 70 cm
transvertors. I understand M modules is no longer in the Ham business.
VE3PYG
--
Dave Stephenson
Geological Survey of Canada
Ottawa, Ontario, Canada *Om Mani Padme Hum 1-2-3*
Internet: stephens@geod.emr.ca

35. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 13:35:26 UTC
From: lkollar@nyx.cs.du.edu
Message-ID: <1993Jul16.133526.17447@mnemosyne.cs.du.edu>
Source record: 28695

greg@core.rose.hp.com (Greg Dolkas) writes:

>How do you work the doppler shift if you can't hear yourself on the downlink
>while you're talking on the uplink? I work RS-10 all the time, but it takes
>me 2 radios, even though one of them can do both links (just not at the same
>time).

That's where the old-style split twin rigs come in handy. TX and RX are
already separate. I have the Heathkit CW twins (HR-1680 and HX-1681), that
would be ideal for RS-12 if only the RX didn't stop at 29.000. Looking at
the schematics, though, setting the "10B" band to cover the OSCAR band takes
replacing one crystal and tweaking one coil. Never did it since I got a good
deal on an HTX-100. :-)

Seems like Drake also made a fine twin rig... does the RX cover all of 10m?
--
Larry Kollar, KC4WZK | 'finger lkollar' for ham-related interests.
lkollar@nyx.cs.du.edu | "Didn't vote for the lottery - won't play it."
"[The media] tore down Bush, now they're trying to tear down Clinton.
Are they trying to destroy the presidency?" - Barry Goldwater

36. AO-21 with dj580?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 15:49:09 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <226ill$c7e@pith.uoregon.edu>
Source record: 28696

Last year there was an article in the "hamsats" column of 73 magazine about working rudak-2 with the dj-580. I have done some experimenting with mine and am wondering if it has a problem. First of all, I would obviously need a linear for the 70cm side. The problem I see is on transmit the 2mtr side is desensed. How can you hear the downlink with a desensed receive side? It appears that the FM signal is not affected by doppler near as bad as SSB (bandwidth?) So maybe you don't need to monitor the downlink? The author of the article (Andy, WA5ZIB) mentioned using headphones to eliminate feedback, so it seems to me he was monitoring the downlink on transmit. Any insights on this from other 580 owners would be appreciated.
Thanks,
--
Jeff Hite KF7SZ
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

37. ORBS$198.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 16:35:15 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-198.o@ampr.org>
Source record: 28708
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-198.O
Orbital Elements 198.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX July 17, 1993
BID: $ORBS-198.O

This Bulletin contains a new NASA element set for
ARSENE. Please send verification reports to N3FKV.

TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93188.53303997
Element set: 6
Inclination: 27.0196 deg
RA of node: 16.9348 deg
Eccentricity: 0.6027383
Arg of perigee: 95.8219 deg
Mean anomaly: 331.6625 deg
Mean motion: 2.05886544 rev/day
Decay rate: -1.43e-06 rev/day^2
Epoch rev: 7568
Checksum: 324

Satellite: UO-11
Catalog number: 14781
Epoch time: 93195.61202625
Element set: 424
Inclination: 97.8097 deg
RA of node: 220.7950 deg
Eccentricity: 0.0010888
Arg of perigee: 275.0132 deg
Mean anomaly: 84.9829 deg
Mean motion: 14.69027040 rev/day
Decay rate: 3.30e-06 rev/day^2
Epoch rev: 50074
Checksum: 299

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93195.64332963
Element set: 631
Inclination: 82.9227 deg
```

RA of node: 218.3152 deg
Eccentricity: 0.0010229
Arg of perigee: 236.9259 deg
Mean anomaly: 123.0889 deg
Mean motion: 13.72320228 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 30361
Checksum: 300

Satellite: AO-13
Catalog number: 19216
Epoch time: 93193.27735507
Element set: 620
Inclination: 57.9441 deg
RA of node: 306.2624 deg
Eccentricity: 0.7229040
Arg of perigee: 319.3334 deg
Mean anomaly: 4.8950 deg
Mean motion: 2.09723491 rev/day
Decay rate: -1.33e-06 rev/day^2
Epoch rev: 3888
Checksum: 303

Satellite: FO-20
Catalog number: 20480
Epoch time: 93189.61407106
Element set: 450
Inclination: 99.0338 deg
RA of node: 41.7405 deg
Eccentricity: 0.0541462
Arg of perigee: 38.1460 deg
Mean anomaly: 325.6705 deg
Mean motion: 12.83220244 rev/day
Decay rate: -8.0e-08 rev/day^2
Epoch rev: 16006
Checksum: 267

Satellite: AO-21
Catalog number: 21087
Epoch time: 93196.58350382
Element set: 810
Inclination: 82.9409 deg
RA of node: 31.8129 deg
Eccentricity: 0.0034280
Arg of perigee: 304.1740 deg
Mean anomaly: 55.6204 deg
Mean motion: 13.74521797 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 12334
Checksum: 289

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93194.70011642
Element set: 410
Inclination: 82.9221 deg
RA of node: 262.4530 deg
Eccentricity: 0.0029590
Arg of perigee: 334.4617 deg
Mean anomaly: 25.5075 deg
Mean motion: 13.74023985 rev/day
Decay rate: 1.1e-07 rev/day^2
Epoch rev: 12216
Checksum: 269

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93171.50001791
Element set: 11
Inclination: 1.1154 deg
RA of node: 126.6985 deg
Eccentricity: 0.2945839
Arg of perigee: 142.5535 deg
Mean anomaly: 241.8895 deg
Mean motion: 1.42200091 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 62
Checksum: 267

/EX
SB KEPS @ AMSAT $ORBS-198.D
Orbital Elements 198.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX July 17, 1993
BID: $ORBS-198.D

ARSENE is now published in the OSCAR Bulletin.

TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93191.23722787
Element set: 757
Inclination: 98.6126 deg
RA of node: 275.2544 deg
Eccentricity: 0.0011687
Arg of perigee: 111.7574 deg
Mean anomaly: 248.4850 deg
Mean motion: 14.29782054 rev/day
Decay rate: 9.8e-07 rev/day^2
Epoch rev: 18072
Checksum: 330

Satellite: AO-16
Catalog number: 20439
Epoch time: 93191.23635073
Element set: 562
Inclination: 98.6208 deg
RA of node: 276.1593 deg
Eccentricity: 0.0011871
Arg of perigee: 112.7565 deg
Mean anomaly: 247.4876 deg
Mean motion: 14.29841154 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 18073
Checksum: 324

Satellite: DO-17
Catalog number: 20440
Epoch time: 93191.22361704
Element set: 564
Inclination: 98.6209 deg
RA of node: 276.3627 deg
Eccentricity: 0.0011639
Arg of perigee: 111.3565 deg
Mean anomaly: 248.8858 deg
Mean motion: 14.29977166 rev/day
Decay rate: 8.7e-07 rev/day^2
Epoch rev: 18074
Checksum: 331

Satellite: WO-18
Catalog number: 20441
Epoch time: 93191.26340100
Element set: 566
Inclination: 98.6203 deg
RA of node: 276.4227 deg
Eccentricity: 0.0012116
Arg of perigee: 112.8955 deg
Mean anomaly: 247.3503 deg
Mean motion: 14.29956753 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 18075
Checksum: 292

Satellite: LO-19
Catalog number: 20442
Epoch time: 93191.75360826
Element set: 563
Inclination: 98.6209 deg
RA of node: 277.0903 deg
Eccentricity: 0.0012885
Arg of perigee: 110.9224 deg
Mean anomaly: 249.3345 deg
Mean motion: 14.30046454 rev/day

Decay rate: 8.2e-07 rev/day^2
Epoch rev: 18083
Checksum: 303

Satellite: UO-22
Catalog number: 21575
Epoch time: 93191.22559993
Element set: 262
Inclination: 98.4720 deg
RA of node: 266.9668 deg
Eccentricity: 0.0006902
Arg of perigee: 231.3193 deg
Mean anomaly: 128.7378 deg
Mean motion: 14.36837895 rev/day
Decay rate: 1.03e-06 rev/day^2
Epoch rev: 10397
Checksum: 337

Satellite: KO-23
Catalog number: 22077
Epoch time: 93185.38088294
Element set: 106
Inclination: 66.0765 deg
RA of node: 288.1820 deg
Eccentricity: 0.0003939
Arg of perigee: 181.8255 deg
Mean anomaly: 178.2750 deg
Mean motion: 12.86279208 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 4205
Checksum: 300

/EX
SB KEPS @ AMSAT $ORBS-198.W
Orbital Elements 198.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX July 17, 1993
BID: $ORBS-198.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93197.09966434
Element set: 415
Inclination: 99.0982 deg
RA of node: 237.7784 deg
Eccentricity: 0.0016109
Arg of perigee: 86.7752 deg
Mean anomaly: 273.5272 deg
Mean motion: 14.13531294 rev/day
Decay rate: 6.0e-07 rev/day^2

Epoch rev: 44286
Checksum: 337

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93197.00205386
Element set: 258
Inclination: 98.5149 deg
RA of node: 211.1598 deg
Eccentricity: 0.0012176
Arg of perigee: 229.5013 deg
Mean anomaly: 130.5110 deg
Mean motion: 14.24821093 rev/day
Decay rate: 1.19e-06 rev/day^2
Epoch rev: 35473
Checksum: 290
Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93191.02311804
Element set: 874
Inclination: 82.5423 deg
RA of node: 180.7525 deg
Eccentricity: 0.0018324
Arg of perigee: 59.3743 deg
Mean anomaly: 300.9221 deg
Mean motion: 13.84687776 rev/day
Decay rate: 2.9e-07 rev/day^2
Epoch rev: 27500
Checksum: 301

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93194.02258664
Element set: 47
Inclination: 82.5404 deg
RA of node: 203.6663 deg
Eccentricity: 0.0018698
Arg of perigee: 29.0963 deg
Mean anomaly: 331.1196 deg
Mean motion: 13.16959778 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 23861
Checksum: 325

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93196.92048640
Element set: 165
Inclination: 99.1333 deg
RA of node: 173.2853 deg
Eccentricity: 0.0012230

Arg of perigee: 3.0787 deg
Mean anomaly: 357.0453 deg
Mean motion: 14.12896235 rev/day
Decay rate: 9.2e-07 rev/day^2
Epoch rev: 24773
Checksum: 297

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93194.67861196
Element set: 812
Inclination: 82.5191 deg
RA of node: 53.8053 deg
Eccentricity: 0.0015527
Arg of perigee: 92.9242 deg
Mean anomaly: 267.3694 deg
Mean motion: 13.84340257 rev/day
Decay rate: 7.6e-07 rev/day^2
Epoch rev: 22085
Checksum: 329

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93197.00591783
Element set: 721
Inclination: 82.5518 deg
RA of node: 144.5414 deg
Eccentricity: 0.0018576
Arg of perigee: 41.4357 deg
Mean anomaly: 318.8170 deg
Mean motion: 13.16021360 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 17889
Checksum: 293

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93194.86381434
Element set: 565
Inclination: 82.5475 deg
RA of node: 117.2064 deg
Eccentricity: 0.0017332
Arg of perigee: 21.4305 deg
Mean anomaly: 338.7556 deg
Mean motion: 13.84178382 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 15381
Checksum: 306

Satellite: FY-1/2
Catalog number: 20788

Epoch time: 93195.74840446
Element set: 598
Inclination: 98.8658 deg
RA of node: 221.2746 deg
Eccentricity: 0.0014735
Arg of perigee: 225.6392 deg
Mean anomaly: 134.3566 deg
Mean motion: 14.01308372 rev/day
Decay rate: -2.44e-06 rev/day^2
Epoch rev: 14644
Checksum: 328

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93194.64633721
Element set: 569
Inclination: 82.5253 deg
RA of node: 55.3406 deg
Eccentricity: 0.0012108
Arg of perigee: 282.2356 deg
Mean anomaly: 77.7447 deg
Mean motion: 13.83554704 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 14094
Checksum: 301

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93194.63761360
Element set: 370
Inclination: 82.5422 deg
RA of node: 49.0308 deg
Eccentricity: 0.0018463
Arg of perigee: 330.0867 deg
Mean anomaly: 29.9199 deg
Mean motion: 13.16823474 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10680
Checksum: 292

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93197.08123349
Element set: 621
Inclination: 98.6544 deg
RA of node: 226.6416 deg
Eccentricity: 0.0013728
Arg of perigee: 126.9349 deg
Mean anomaly: 233.3083 deg
Mean motion: 14.22286754 rev/day
Decay rate: 1.78e-06 rev/day^2

Epoch rev: 11275
Checksum: 308

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93194.86917516
Element set: 438
Inclination: 82.5521 deg
RA of node: 355.6676 deg
Eccentricity: 0.0013956
Arg of perigee: 327.4605 deg
Mean anomaly: 32.5656 deg
Mean motion: 13.16822825 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9193
Checksum: 328

/EX
SB KEPS @ AMSAT $ORBS-198.M
Orbital Elements 198.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX July 17, 1993
BID: $ORBS-198.M
TO ALL RADIO AMATEURS BT
Satellite: MIR
Catalog number: 16609
Epoch time: 93196.07460589
Element set: 176
Inclination: 51.6204 deg
RA of node: 79.4726 deg
Eccentricity: 0.0005033
Arg of perigee: 195.5489 deg
Mean anomaly: 164.5260 deg
Mean motion: 15.58753196 rev/day
Decay rate: 2.540e-05 rev/day^2
Epoch rev: 42348
Checksum: 322

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93196.77152277
Element set: 144
Inclination: 28.4703 deg
RA of node: 240.0415 deg
Eccentricity: 0.0004518
Arg of perigee: 347.3242 deg
Mean anomaly: 12.7213 deg
Mean motion: 14.92761200 rev/day
Decay rate: 4.82e-06 rev/day^2
Epoch rev: 17579

Checksum: 273

Satellite: GRO
Catalog number: 21225
Epoch time: 93197.09516370
Element set: 940
Inclination: 28.4638 deg
RA of node: 85.8396 deg
Eccentricity: 0.0005941
Arg of perigee: 264.8037 deg
Mean anomaly: 95.1907 deg
Mean motion: 15.73765024 rev/day
Decay rate: 1.9558e-04 rev/day^2
Epoch rev: 467
Checksum: 327

Satellite: TUBSAT
Catalog number: 21577
Epoch time: 93195.74301671
Element set: 266
Inclination: 98.4716 deg
RA of node: 270.9666 deg
Eccentricity: 0.0004910
Arg of perigee: 221.6757 deg
Mean anomaly: 138.4055 deg
Mean motion: 14.36385052 rev/day
Decay rate: 6.3e-07 rev/day^2
Epoch rev: 10459
Checksum: 308

Satellite: SARA
Catalog number: 21578
Epoch time: 93196.68753844
Element set: 436
Inclination: 98.4773 deg
RA of node: 273.6495 deg
Eccentricity: 0.0004242
Arg of perigee: 206.6612 deg
Mean anomaly: 153.4357 deg
Mean motion: 14.38475853 rev/day
Decay rate: 4.22e-06 rev/day^2
Epoch rev: 10482
Checksum: 326

Satellite: UARS
Catalog number: 21701
Epoch time: 93180.90809607
Element set: 249
Inclination: 56.9829 deg
RA of node: 130.4931 deg
Eccentricity: 0.0005121

Arg of perigee: 81.4948 deg
Mean anomaly: 278.6647 deg
Mean motion: 14.96666224 rev/day
Decay rate: -8.39e-06 rev/day^2
Epoch rev: 9820
Checksum: 324

Satellite: FREJA
Catalog number: 22161
Epoch time: 93193.05977951
Element set: 140
Inclination: 63.0017 deg
RA of node: 72.8751 deg
Eccentricity: 0.0770630
Arg of perigee: 285.0089 deg
Mean anomaly: 66.6933 deg
Mean motion: 13.21649153 rev/day
Decay rate: -3.4e-07 rev/day^2
Epoch rev: 3684
Checksum: 294

/EX

38. ORBS$198.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 16:36:58 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-198.n@ampr.org>
Source record: 28707
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-198.N
2Line Orbital Elements 198.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX July 17, 1993
BID: $ORBS-198.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93188.53303997 -.00000143 00000-0 99999-4 0 66
2 14129 27.0196 16.9348 6027383 95.8219 331.6625 2.05886544 75682
UO-11
1 14781U 84 21 B 93195.61202625 .00000330 00000-0 60216-4 0 4245
2 14781 97.8097 220.7950 0010888 275.0132 84.9829 14.69027040500742
RS-10/11
1 18129U 87 54 A 93195.64332963 .00000088 00000-0 89554-4 0 6312
2 18129 82.9227 218.3152 0010229 236.9259 123.0889 13.72320228303619
AO-13
1 19216U 88 51 B 93193.27735507 -.00000133 00000-0 99999-4 0 6200
2 19216 57.9441 306.2624 7229040 319.3334 4.8950 2.09723491 38884
FO-20
1 20480U 90 13 C 93189.61407106 -.00000008 00000-0 10182-4 0 4509
2 20480 99.0338 41.7405 0541462 38.1460 325.6705 12.83220244160062
AO-21
1 21087U 91 6 A 93196.58350382 .00000085 00000-0 82656-4 0 8102
2 21087 82.9409 31.8129 0034280 304.1740 55.6204 13.74521797123343
RS-12/13
1 21089U 91 7 A 93194.70011642 .00000011 00000-0 53034-5 0 4104
2 21089 82.9221 262.4530 0029590 334.4617 25.5075 13.74023985122169
ARSENE
1 22654U 93 31 B 93171.50001791 -.00000049 00000-0 99999-4 0 117
2 22654 1.1154 126.6985 2945839 142.5535 241.8895 1.42200091 629
UO-14
1 20437U 90 5 B 93191.23722787 .00000098 00000-0 45905-4 0 7577
2 20437 98.6126 275.2544 0011687 111.7574 248.4850 14.29782054180729
AO-16
1 20439U 90 5 D 93191.23635073 .00000088 00000-0 41879-4 0 5629
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2 20439 98.6208 276.1593 0011871 112.7565 247.4876 14.29841154180737
DO-17
1 20440U 90 5 E 93191.22361704 .00000087 00000-0 41709-4 0 5640
2 20440 98.6209 276.3627 0011639 111.3565 248.8858 14.29977166180746
WO-18
1 20441U 90 5 F 93191.26340100 .00000081 00000-0 39142-4 0 5666
2 20441 98.6203 276.4227 0012116 112.8955 247.3503 14.29956753180759
LO-19
1 20442U 90 5 G 93191.75360826 .00000082 00000-0 39665-4 0 5636
2 20442 98.6209 277.0903 0012885 110.9224 249.3345 14.30046454180830
UO-22
1 21575U 91 50 B 93191.22559993 .00000103 00000-0 41910-4 0 2628
2 21575 98.4720 266.9668 0006902 231.3193 128.7378 14.36837895103974
KO-23
1 22077U 92 52 B 93185.38088294 .00000000 00000-0 99999-4 0 1063
2 22077 66.0765 288.1820 0003939 181.8255 178.2750 12.86279208 42059
NOAA-9
1 15427U 84123 A 93197.09966434 .00000060 00000-0 41861-4 0 4150
2 15427 99.0982 237.7784 0016109 86.7752 273.5272 14.13531294442863
NOAA-10
1 16969U 86 73 A 93197.00205386 .00000119 00000-0 58889-4 0 2589
2 16969 98.5149 211.1598 0012176 229.5013 130.5110 14.24821093354732
MET-2/17
1 18820U 88 5 A 93191.02311804 .00000029 00000-0 20954-4 0 8749
2 18820 82.5423 180.7525 0018324 59.3743 300.9221 13.84687776275000
MET-3/2
1 19336U 88 64 A 93194.02258664 .00000043 00000-0 99999-4 0 477
2 19336 82.5404 203.6663 0018698 29.0963 331.1196 13.16959778238614
NOAA-11
1 19531U 88 89 A 93196.92048640 .00000092 00000-0 60094-4 0 1652
2 19531 99.1333 173.2853 0012230 3.0787 357.0453 14.12896235247732
MET-2/18
1 19851U 89 18 A 93194.67861196 .00000076 00000-0 62496-4 0 8128
2 19851 82.5191 53.8053 0015527 92.9242 267.3694 13.84340257220855
MET-3/3
1 20305U 89 86 A 93197.00591783 .00000043 00000-0 99999-4 0 7212
2 20305 82.5518 144.5414 0018576 41.4357 318.8170 13.16021360178899
MET-2/19
1 20670U 90 57 A 93194.86381434 .00000051 00000-0 40357-4 0 5657
2 20670 82.5475 117.2064 0017332 21.4305 338.7556 13.84178382153810
FY-1/2
1 20788U 90 81 A 93195.74840446 -.00000244 00000-0 -15056-3 0 5984
2 20788 98.8658 221.2746 0014735 225.6392 134.3566 14.01308372146440
MET-2/20
1 20826U 90 86 A 93194.64633721 .00000071 00000-0 59251-4 0 5696
2 20826 82.5253 55.3406 0012108 282.2356 77.7447 13.83554704140942
MET-3/4
1 21232U 91 30 A 93194.63761360 .00000043 00000-0 99999-4 0 3700
2 21232 82.5422 49.0308 0018463 330.0867 29.9199 13.16823474106801
NOAA-12
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1 21263U 91 32 A 93197.08123349 .00000178 00000-0 88592-4 0 6212
2 21263 98.6544 226.6416 0013728 126.9349 233.3083 14.22286754112753
MET-3/5
1 21655U 91 56 A 93194.86917516 .00000043 00000-0 99999-4 0 4383
2 21655 82.5521 355.6676 0013956 327.4605 32.5656 13.16822825 91930
MIR
1 16609U 86 17 A 93196.07460589 .00002540 00000-0 35521-4 0 1769
2 16609 51.6204 79.4726 0005033 195.5489 164.5260 15.58753196423484
HUBBLE
1 20580U 90 37 B 93196.77152277 .00000482 00000-0 38358-4 0 1447
2 20580 28.4703 240.0415 0004518 347.3242 12.7213 14.92761200175797
GRO
1 21225U 91 27 B 93197.09516370 .00019558 00000-0 12988-3 0 9406
2 21225 28.4638 85.8396 0005941 264.8037 95.1907 15.73765024 4671
TUBSAT
1 21577U 91 50 D 93195.74301671 .00000063 00000-0 28404-4 0 2661
2 21577 98.4716 270.9666 0004910 221.6757 138.4055 14.36385052104591
SARA
1 21578U 91 50 E 93196.68753844 .00000422 00000-0 15193-3 0 4367
2 21578 98.4773 273.6495 0004242 206.6612 153.4357 14.38475853104825
UARS
1 21701U 91 63 B 93180.90809607 -.00000839 00000-0 -62477-4 0 2490
2 21701 56.9829 130.4931 0005121 81.4948 278.6647 14.96666224 98201
FREJA
1 22161U 92 64 A 93193.05977951 -.00000034 00000-0 69821-5 0 1408
2 22161 63.0017 72.8751 0770630 285.0089 66.6933 13.21649153 36845
/EX
```

39. WANTED: Kits for radios for satellites (10m/2m/70cm))

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 20:40:44 UTC
From: dquaglia@cbnewsj.cb.att.com
Message-ID: <CA9ys3.2EE@cbnewsj.cb.att.com>
Source record: 28697

I'm looking for plans, kits, articles, or other information on
simple CW/SSB transmitters, receivers and transceivers for
28Mhz, 144Mhz or 440Mhz. I would like to BUILD a SIMPLE satellite
radio for CW/SSB. I already have a list of suppliers; I'm
looking for specific references to kits, plans, etc. that are available.

Replies to rec.radio.amateur.space or
email to dquagliana@attmail.com please.

Douglas Quagliana KA2UPW
dquagliana@attmail.com

40. Re: WANTED: Kits for radios for satellites (10m/2m/70cm))

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 21:46:55 UTC
From: jeffj@cbnewsm.cb.att.com
Message-ID: <CAA1u9.I5u@cbnewsm.cb.att.com>
Source record: 28698

In article <CA9ys3.2EE@cbnewsj.cb.att.com> dquaglia@cbnewsj.cb.att.com (douglas.quagliana) writes:
>I'm looking for plans, kits, articles, or other information on
>simple CW/SSB transmitters, receivers and transceivers for
>28Mhz, 144Mhz or 440Mhz. I would like to BUILD a SIMPLE satellite
>radio for CW/SSB. I already have a list of suppliers; I'm
>looking for specific references to kits, plans, etc. that are available.

Check out a copy of Solid State Design for the Radio Amateur. They show how to build a 144mhz VFO and I think a SSB tranmitter for it too. Also they show how to build a SSB transmitter for other bands in the book too. Hope this helps!

Jeff

--
Jeff Jones AB6MB | OPPOSE THE NORTH AMERICAN FREE TRADE AGREEMENT!
jeffj@seeker.mystic.com | Canada/USA Free Trade cost Canada 400,000 jobs.
Infolinc BBS 415-778-5929 | Want to guess how many we'll lose to Mexico?

41. Re: AO-21 with dj580?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-16 23:52:26 UTC
From: greg@core.rose.hp.com
Message-ID: <CAA7nE.M9o@icon.rose.hp.com>
Source record: 28699

Jeff,

The 580 can work in full duplex, so the listening-while-talking and the use of headphones is consistent with what you read. Hitting AO-21 on <5 watts is not real common, however, from what I've heard. I've tried using 10 watts and a ground plane antenna, with no luck. I'm sure a better antenna is needed, and probably a bit more power.

Greg KD6KGW

42. SPACE TRIVIA LIST - update

Newsgroup: rec.radio.amateur.space
Date: 1993-07-17 09:55:12 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Jul17.095512.6528@scorch.apana.org.au>
Source record: 28700

You people might be interested to know that we have decided at last not to waste your bandwidth with our rapidly-growing Space Trivia List. I mentioned in the original posting that if anyone thought I was wasting space, or thought that the list was inappropriate for this group, then we would gladly stop posting it.

I'm actually quite happy to say that no-one has complained, which to me seems to indicate that nobody was unhappy about the list. Still, I was hoping there might have been some bits of Trivia I could have gained from this group - Perhaps concerning that English school that learned of the New Soviet launch centre before the rest of the world, as I am having trouble finding information about that.

I'll keep my nose poking around this group every now and then to try and raise some interest, but otherwise I will avoid the long posting of the list until such a time as there is anthing worth reading for any of you! I'll search around myself for amateur radio trivia, and when something comes up, rest assured you guys will be informed.

Oh yeah, and by the way, if you have any trivia PLEASE let us know. We absolutely thrive on the stuff now!

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

43. Re: Contructional details for 2m helical

Newsgroup: rec.radio.amateur.space
Date: 1993-07-17 20:01:52 UTC
From: smace@nyx.cs.du.edu
Message-ID: <1993Jul17.200152.2201@mnemosyne.cs.du.edu>
Source record: 28701
Cross-posted to: rec.radio.amateur.antenna,rec.radio.amateur.space

In article <22159a$2ol9@ilx018.intel.com> dbraun@iil.intel.com writes:
>In article <1993Jul9.213025.4213@mnemosyne.cs.du.edu>, smace@nyx.cs.du.edu (Scott Mace) writes:
>|> I'm trying to build a huge 6 turn helical antenna for the 137mhz to
>|> 138mhz weather sat band. I've made a prototype out of 1x1 pine frame
>|> with no. 8 wire for the helix, and a reflector screen made from
>|> a few large peices of heavy duty screen.
>
>Does one really need such a fancy antenna go get wesats?
>I notice a get a decent signal (well, to the ear) from
>a scanner with its built-in whip antenna indoors.

The problem is that you get lots of fade with a standard whip. I seriously doubt that a whip could pickup a wesat a 0.5 degrees elevation.
I used to have a 4 ele. crossed yagi, and I still got signal fades. Once I built my helical, I got no signal fades.

>
>Also, generally speaking, can't you receive CP transmissions
>OK with an ordinary antenna (apart from the 3db power loss?)
>I would assume that there would not be too much multipath
>from a satellite.
>

This is true but with a 5watt signal, I'd like as much gain as I can.

>But then, this thing would look impressive up on the roof...

Yes, It does.....

It all depends on the operator. Some people might be quite happy with a simple 2 ele crossed yagi. In fact, the first wsat antenna I used was a 2 ele crossed yagi. But now, I've found that my earlier antenna just coulsn't cut it. I built my 2m helical for under $50, and am quite pleased with it.

--
****
* Scott Mace internet: smace@nyx.cs.du.edu *
* emace@tenet.edu *
****

44. Re: Contructional details for 2m helical

Newsgroup: rec.radio.amateur.space
Date: 1993-07-17 20:25:51 UTC
From: smace@nyx.cs.du.edu
Message-ID: <1993Jul17.202551.2798@mnemosyne.cs.du.edu>
Source record: 28702
Cross-posted to: rec.radio.amateur.antenna,rec.radio.amateur.space

>>In article <1993Jul9.213025.4213@mnemosyne.cs.du.edu>, smace@nyx.cs.du.edu (Scott Mace)
writes:
>>|> I'm trying to build a huge 6 turn helical antenna for the 137mhz to
>>|> 138mhz weather sat band. I've made a prototype out of 1x1 pine frame
>>|> with no. 8 wire for the helix, and a reflector screen made from
>>|> a few large peices of heavy duty screen.
>>

I have spent a few weekends working out a better design, and hears what I
came up with.

a 1x1 frame. about 8ft long 2.5ft with. I have a piece of 1-1/4" galvanized
steel pipe for the boom. the boom is mounted perpendicular to the frame.
I was able to rearranged the cables on my mast to that I could mount the
antenna about a foot closer. This seemed to reduce alot of the rotational
torque.

Scott Mace

--
****
* Scott Mace internet: smace@nyx.cs.du.edu *
* emace@tenet.edu *
****

45. What is SEDSAT???

Newsgroup: rec.radio.amateur.space
Date: 1993-07-17 22:16:54 UTC
From: ae674@yfn.ysu.edu
Message-ID: <229tom$42c@news.ysu.edu>
Source record: 28703

```
There seemed to be a short lived thread asking for info on SEDSAT.
I know generaly that it will be a tether lauched hamsat. If some-
body knows the specifics please post them.
Thanks, Reid Savage N9SYW
--
```

46. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-18 06:13:30 UTC
From: dbraun@ilx049.intel.com
Message-ID: <22apma$2qa8@ilx018.intel.com>
Source record: 28704

I was listening to RS-10 and RS-12 recently. RS-10 sounded fine to me, but
RS-12 always had this strange, severe flutter in all the 29 MHz signals.
It sounded like very rapid multipath distortion in a car FM (broadcast)
receiver, or maybe like there was something intermittent in the satellite.

Does anyone else hear this? Is it some wierd propagation thing? But
if so, I would expect RS-10 and RS-12 to sound the same.

--
Doug Braun

Email: dbraun@iil.intel.com
Intel Mail: IDC1-41
iNet: 8-435-5069 Long Distance: 011-972-4-655069
Fax: 8-435-5999 Long Distance: 011-972-4-655999
Snail Mail: US: Other:
PO Box 311 Intel Israel, Ltd.
Mendham, NJ 07945 IDC1-41
Matam Scientific Center
Haifa, Israel 31015

"There is no human problem which could not be solved if
people would simply do as I advise." -- Gore Vidal

47. APT-Satellites: Report JULY 18, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-19 07:20:16 UTC
From: peter.henne@gmd.de
Message-ID: <1993Jul19.072016.29488@gmd.de>
Source record: 28705
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, JULY 18, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 ON again
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 On

VHF-Conflict NOAA-10/NOAA-12 ended, APT NOAA-10 is active again.
Launch of a new METEOR(2?) was announced for JULY 15 (info from
wxsat-mail-list). There was *NO* new APT-source 137.00-137.99 MHz
from 0630 to 1800 UT. METEOR 3-4 transmits vis at early morning
ascendig passes, but only the synch-burst at evening descending
passes, no infrared-imaging. Seems the spacecraft is too near to
the terminator or ir-imaging is down. Meteor 3-5 APT is off.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

48. IC275a and DSP2232 - 9.6 Kb Connection

Newsgroup: rec.radio.amateur.space
Date: 1993-07-19 10:53:10 UTC
From: seeler@UPEI.CA
Message-ID: <seeler.25.743079190@UPEI.CA>
Source record: 28706

I was wondering if any of the readers of this group have had the opportunity to connect a 9.6 Kb modem to the ACC1 or other port of the IC275a - or are modifications required for the rig in order to operate 9.6 Kb packet. Any information would be appreciated. I have heard that 9.6 Kb packet is possible with the 275a with few if any mods if the second rear panel port is used.

Thank you for your consideration of this request for information.

73 Dave, VY2DCS
Prince Edward Island

Internet: Seeler@Upei.CA

49. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-19 18:06:32 UTC
From: mckee@fc.hp.com
Message-ID: <CAFBMw.LFA@fc.hp.com>
Source record: 28709

Greg Dolkas (greg@core.rose.hp.com) wrote:
: Bret McKee (mckee@fc.hp.com) wrote:

: How do you work the doppler shift if you can't hear yourself on the downlink
: while you're talking on the uplink? I work RS-10 all the time, but it takes
: me 2 radios, even though one of them can do both links (just not at the same
: time).

: I'd dearly like to ditch the Radio Shack shortwave receiver I've been using
: for the downlink, and convince the Yaesu FT-767GX that it can do both.

: Greg KD6KGW.

Actually, I just don't worry about it :-) As the signal I am listening
to moves, I change the receive an just leave the trasmit sit. I'm assuming that
the other station does the same. It seems to work pretty well.

73,

Bret "who probably just made enemies of most REAL satellite users" McKee
N0MTA

50. Re: RS 12/13 mode A working?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-19 22:36:39 UTC
From: greg@core.rose.hp.com
Message-ID: <CAFo53.JqM@icon.rose.hp.com>
Source record: 28710

Bret McKee (mckee@fc.hp.com) wrote:
: Actually, I just don't worry about it :-) As the signal I am listening
: to moves, I change the receive an just leave the trasmit sit. I'm assuming that
: the other station does the same. It seems to work pretty well.
:
: 73,
:
: Bret "who probably just made enemies of most REAL satellite users" McKee
: N0MTA

Well, your signature kind of sums it up :-)... I believe the proper use of the satellites is to leave your receiver fixed, and move the transmitter in real-time to correct for doppler. Otherwise you end up skidding across the band, and likely colliding with other QSOs in progress.

Either way, you need two independent radios, one for down, the other for up.

Greg KD6KGW

51. Staellite Data Formats

Newsgroup: rec.radio.amateur.space
Date: 1993-07-20 06:21:46 UTC
From: dbraun@ilx049.intel.com
Message-ID: <22g2tq$2thg@ilx018.intel.com>
Source record: 28711

Could someone tell me some info about the digital formats
that the various satellites use? I'm confused. I
know that a few use "normal" 1200 baud AFSK FM for
uplinks and/or downlinks, but most others use some other
modulation method that requires a special modem (different
for uplink vs. downlink).

What other types of madulation are used? How does one obtain the
necessary modems? I haven't seen anything mentioned in the
catalogs of the big mail order houses except very expensive
high-end TNCs. Who sells (cheaper) modems (or kits?) that will plug
into the modem disconnect header on my vanilla TNC?

Sorry if these are easy questions, but here in 4X land I don't
get all the magazines, junk mail, etc. I would in the USA.

--
Doug Braun (N1OWU/4X)

Email: dbraun@iil.intel.com
Intel Mail: IDC1-41
iNet: 8-435-5069 Long Distance: 011-972-4-655069
Fax: 8-435-5999 Long Distance: 011-972-4-655999
Snail Mail: US: Other:
PO Box 311 Intel Israel, Ltd.
Mendham, NJ 07945 IDC1-41
Matam Scientific Center
Haifa, Israel 31015

"There is no human problem which could not be solved if
people would simply do as I advise." -- Gore Vidal

52. DOVE

Newsgroup: rec.radio.amateur.space
Date: 1993-07-20 11:22:22 UTC
From: dbraun@ilx049.intel.com
Message-ID: <22gkhe$2tk0@ilx018.intel.com>
Source record: 28712

I tried listening to DOVE during several passes on 145.825 and
thereabouts, but heard nothing. Is DOVE fried? I read
(in the ARRL "Operating Guide") that this is an easy satellite
to hear. Does it have a funny schedule, or should its beacons
be sending something all the time?

--
Doug Braun

Email: dbraun@iil.intel.com
Intel Mail: IDC1-41
iNet: 8-435-5069 Long Distance: 011-972-4-655069
Fax: 8-435-5999 Long Distance: 011-972-4-655999
Snail Mail: US: Other:
PO Box 311 Intel Israel, Ltd.
Mendham, NJ 07945 IDC1-41
Matam Scientific Center
Haifa, Israel 31015

"There is no human problem which could not be solved if
people would simply do as I advise." -- Gore Vidal

53. Re: Staellite Data Formats

Newsgroup: rec.radio.amateur.space
Date: 1993-07-20 17:21:20 UTC
From: ae517@Freenet.carleton.ca
Message-ID: <CAH47K.181@freenet.carleton.ca>
Source record: 28713

In a previous article, dbraun@ilx049.intel.com (Doug Braun) says:

>
>What other types of madulation are used? How does one obtain the
>necessary modems? I haven't seen anything mentioned in the
>catalogs of the big mail order houses except very expensive
>high-end TNCs. Who sells (cheaper) modems (or kits?) that will plug
>into the modem disconnect header on my vanilla TNC?
>
>Sorry if these are easy questions, but here in 4X land I don't
>get all the magazines, junk mail, etc. I would in the USA.
>
Hey, I like easy questions!

Well, UO-22 and KO-23 are using 9600 baud FSK for both the uplink
and downlink. Modems are availble from PacCom in Florida, from
TAPR in Tuscon, AZ and I think MFJ makes one for their TNC as
well. The 9600 baud format seems to work pretty well.

The Microsat, on the other hand, seem to use 1200 baud raised
cosine modulation, PSK modulation and more exotic modulation
techniques (I say this because I don't have the necessary modem
and it seems exotic to me!) I believe that PacCom again sells
the necessary gizmo to receive these signals.

Some of the DSP modems that are coming onto the market should
be able to demodulate the Microsat signals as well. LL Grace,
and AEA would be two like suppliers.

I am slowing trying to get a KO-23 station on the air. My equipment
is a PacCom Tiny2 with the g3ruh 9600 baud modem, a Hamtronics
70cm to 10 metres receive converter working into my TS-440. I'm
just doing the work now to get my modem TXD into my IC-251. I
don't know how well I am going to be able to uplink using just
a dual band J-pole with 10 watts, but I guess I will find out!

--

54. Re: Staellite Data Formats

Newsgroup: rec.radio.amateur.space
Date: 1993-07-22 05:23:59 UTC
From: tedwards@eng.umd.edu
Message-ID: <22l89fINNffc@mojo.eng.umd.edu>
Source record: 28714

In article <CAH47K.181@freenet.carleton.ca> ae517@Freenet.carleton.ca (Russ Renaud) writes:
>Some of the DSP modems that are coming onto the market should
>be able to demodulate the Microsat signals as well. LL Grace,
>and AEA would be two like suppliers.

I have used the DSP-1232 from AEA to do Pacsat. As of right now
I don't think the Doppler adjust is in the DSP software yet
(any news on this???), which means you have to adjust it yourself,
but I still have done lots with it.

Probably the biggest problem going to 9600 bps is not the modem, but
connecting into your radio beyond the point where voice filters
limit the bandwidth. I have not yet found any information for how
to do this with our IC-275 and IC-475 rigs...

We've also used the DSP to decode AO-13 telemetry.

-Thomas
N3HAU
member W3EAX, U Maryland ARA

55. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-07-23 16:48:10 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-743446079@unomaha.edu>
Source record: 28715
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

```
Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
```

arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
==========

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

56. ORBS$205.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-07-23 17:02:48 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-205.o@ampr.org>
Source record: 28721
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-205.O
Orbital Elements 205.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX July 24, 1993
BID: $ORBS-205.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93200.18785409
Element set: 9
Inclination: 27.0768 deg
RA of node: 15.1878 deg
Eccentricity: 0.6022626
Arg of perigee: 98.7005 deg
Mean anomaly: 329.8696 deg
Mean motion: 2.05880809 rev/day
Decay rate: 2.7e-07 rev/day^2
Epoch rev: 7592
Checksum: 322

Satellite: UO-11
Catalog number: 14781
Epoch time: 93198.60902225
Element set: 425
Inclination: 97.8099 deg
RA of node: 223.6595 deg
Eccentricity: 0.0010545
Arg of perigee: 263.2244 deg
Mean anomaly: 96.7762 deg
Mean motion: 14.69026926 rev/day
Decay rate: 2.53e-06 rev/day^2
Epoch rev: 50118
Checksum: 319

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93199.50757804
Element set: 632
Inclination: 82.9227 deg
RA of node: 215.4592 deg
Eccentricity: 0.0010367
Arg of perigee: 225.8425 deg
```

Mean anomaly: 134.1868 deg
Mean motion: 13.72320353 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 30414
Checksum: 304

Satellite: AO-13
Catalog number: 19216
Epoch time: 93202.33713546
Element set: 623
Inclination: 57.8903 deg
RA of node: 304.6158 deg
Eccentricity: 0.7223772
Arg of perigee: 320.1229 deg
Mean anomaly: 4.9105 deg
Mean motion: 2.09727230 rev/day
Decay rate: -2.69e-06 rev/day^2
Epoch rev: 3907
Checksum: 288

Satellite: FO-20
Catalog number: 20480
Epoch time: 93201.62045726
Element set: 451
Inclination: 99.0326 deg
RA of node: 51.4678 deg
Eccentricity: 0.0541409
Arg of perigee: 10.9621 deg
Mean anomaly: 350.2744 deg
Mean motion: 12.83220462 rev/day
Decay rate: -8.0e-08 rev/day^2
Epoch rev: 16160
Checksum: 265

Satellite: AO-21
Catalog number: 21087
Epoch time: 93202.62536230
Element set: 815
Inclination: 82.9405 deg
RA of node: 27.3398 deg
Eccentricity: 0.0034082
Arg of perigee: 286.8119 deg
Mean anomaly: 72.9281 deg
Mean motion: 13.74521997 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 12417
Checksum: 306

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93194.70011642

Element set: 410
Inclination: 82.9221 deg
RA of node: 262.4530 deg
Eccentricity: 0.0029590
Arg of perigee: 334.4617 deg
Mean anomaly: 25.5075 deg
Mean motion: 13.74023985 rev/day
Decay rate: 1.1e-07 rev/day^2
Epoch rev: 12216
Checksum: 269

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93171.50001791
Element set: 11
Inclination: 1.1154 deg
RA of node: 126.6985 deg
Eccentricity: 0.2945839
Arg of perigee: 142.5535 deg
Mean anomaly: 241.8895 deg
Mean motion: 1.42200091 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 62
Checksum: 267

/EX
SB KEPS @ AMSAT $ORBS-205.D
Orbital Elements 205.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX July 24, 1993
BID: $ORBS-205.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93200.26473020
Element set: 758
Inclination: 98.6135 deg
RA of node: 284.1842 deg
Eccentricity: 0.0011997
Arg of perigee: 86.8343 deg
Mean anomaly: 273.4178 deg
Mean motion: 14.29782897 rev/day
Decay rate: 6.5e-07 rev/day^2
Epoch rev: 18201
Checksum: 322

Satellite: AO-16
Catalog number: 20439
Epoch time: 93200.26347958
Element set: 563

Inclination: 98.6210 deg
RA of node: 285.0949 deg
Eccentricity: 0.0012487
Arg of perigee: 88.0964 deg
Mean anomaly: 272.1649 deg
Mean motion: 14.29841825 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 18202
Checksum: 327

Satellite: DO-17
Catalog number: 20440
Epoch time: 93200.31985796
Element set: 565
Inclination: 98.6215 deg
RA of node: 285.3710 deg
Eccentricity: 0.0012509
Arg of perigee: 87.3715 deg
Mean anomaly: 272.8894 deg
Mean motion: 14.29978118 rev/day
Decay rate: 5.8e-07 rev/day^2
Epoch rev: 18204
Checksum: 330

Satellite: WO-18
Catalog number: 20441
Epoch time: 93200.77960521
Element set: 567
Inclination: 98.6216 deg
RA of node: 285.8500 deg
Eccentricity: 0.0013084
Arg of perigee: 86.6248 deg
Mean anomaly: 273.6431 deg
Mean motion: 14.29957691 rev/day
Decay rate: 6.1e-07 rev/day^2
Epoch rev: 18211
Checksum: 309

Satellite: LO-19
Catalog number: 20442
Epoch time: 93200.77943508
Element set: 564
Inclination: 98.6215 deg
RA of node: 286.0309 deg
Eccentricity: 0.0013252
Arg of perigee: 84.8513 deg
Mean anomaly: 275.4181 deg
Mean motion: 14.30048277 rev/day
Decay rate: 7.8e-07 rev/day^2
Epoch rev: 18212
Checksum: 299

Satellite: UO-22
Catalog number: 21575
Epoch time: 93200.69628709
Element set: 263
Inclination: 98.4714 deg
RA of node: 276.2830 deg
Eccentricity: 0.0007013
Arg of perigee: 195.8075 deg
Mean anomaly: 164.2889 deg
Mean motion: 14.36839639 rev/day
Decay rate: 7.3e-07 rev/day^2
Epoch rev: 10533
Checksum: 326

Satellite: KO-23
Catalog number: 22077
Epoch time: 93199.53163862
Element set: 107
Inclination: 66.0764 deg
RA of node: 258.5539 deg
Eccentricity: 0.0003204
Arg of perigee: 181.1709 deg
Mean anomaly: 178.9304 deg
Mean motion: 12.86279536 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 4387
Checksum: 304

/EX
SB KEPS @ AMSAT $ORBS-205.W
Orbital Elements 205.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX July 24, 1993
BID: $ORBS-205.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93203.61178270
Element set: 419
Inclination: 99.0984 deg
RA of node: 244.4018 deg
Eccentricity: 0.0016068
Arg of perigee: 69.2119 deg
Mean anomaly: 291.0768 deg
Mean motion: 14.13533173 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 44378
Checksum: 321

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93203.60313311
Element set: 262
Inclination: 98.5163 deg
RA of node: 217.5657 deg
Eccentricity: 0.0012353
Arg of perigee: 209.1588 deg
Mean anomaly: 150.8897 deg
Mean motion: 14.24822967 rev/day
Decay rate: 1.26e-06 rev/day^2
Epoch rev: 35567
Checksum: 317

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93200.27227550
Element set: 875
Inclination: 82.5421 deg
RA of node: 173.3941 deg
Eccentricity: 0.0018665
Arg of perigee: 38.2724 deg
Mean anomaly: 321.9757 deg
Mean motion: 13.84688369 rev/day
Decay rate: 2.4e-07 rev/day^2
Epoch rev: 27628
Checksum: 327

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93194.02258664
Element set: 47
Inclination: 82.5404 deg
RA of node: 203.6663 deg
Eccentricity: 0.0018698
Arg of perigee: 29.0963 deg
Mean anomaly: 331.1196 deg
Mean motion: 13.16959778 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 23861
Checksum: 325

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93204.14367337
Element set: 170
Inclination: 99.1338 deg
RA of node: 180.6530 deg
Eccentricity: 0.0011977
Arg of perigee: 343.0478 deg
Mean anomaly: 17.0260 deg
Mean motion: 14.12898523 rev/day
Decay rate: 1.06e-06 rev/day^2

Epoch rev: 24875
Checksum: 293

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93203.06277606
Element set: 813
Inclination: 82.5177 deg
RA of node: 47.1178 deg
Eccentricity: 0.0015955
Arg of perigee: 73.4229 deg
Mean anomaly: 286.8683 deg
Mean motion: 13.84340304 rev/day
Decay rate: 5.3e-07 rev/day^2
Epoch rev: 22201
Checksum: 305

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93204.00035551
Element set: 722
Inclination: 82.5532 deg
RA of node: 139.6110 deg
Eccentricity: 0.0017244
Arg of perigee: 29.6502 deg
Mean anomaly: 330.5594 deg
Mean motion: 13.16022231 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 17981
Checksum: 246

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93194.86381434
Element set: 565
Inclination: 82.5475 deg
RA of node: 117.2064 deg
Eccentricity: 0.0017332
Arg of perigee: 21.4305 deg
Mean anomaly: 338.7556 deg
Mean motion: 13.84178382 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 15381
Checksum: 306

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93202.95994659
Element set: 601
Inclination: 98.8640 deg
RA of node: 228.2729 deg

Eccentricity: 0.0015396
Arg of perigee: 205.0326 deg
Mean anomaly: 155.0112 deg
Mean motion: 14.01304639 rev/day
Decay rate: -2.84e-06 rev/day^2
Epoch rev: 14745
Checksum: 308

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93194.64633721
Element set: 569
Inclination: 82.5253 deg
RA of node: 55.3406 deg
Eccentricity: 0.0012108
Arg of perigee: 282.2356 deg
Mean anomaly: 77.7447 deg
Mean motion: 13.83554704 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 14094
Checksum: 301

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93201.55182390
Element set: 371
Inclination: 82.5400 deg
RA of node: 44.1390 deg
Eccentricity: 0.0017838
Arg of perigee: 313.1818 deg
Mean anomaly: 46.7812 deg
Mean motion: 13.16823044 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10771
Checksum: 262

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93204.04579165
Element set: 627
Inclination: 98.6554 deg
RA of node: 233.4809 deg
Eccentricity: 0.0013919
Arg of perigee: 107.7971 deg
Mean anomaly: 252.4736 deg
Mean motion: 14.22289791 rev/day
Decay rate: 1.98e-06 rev/day^2
Epoch rev: 11374
Checksum: 326

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93203.68290353
Element set: 441
Inclination: 82.5514 deg
RA of node: 349.4389 deg
Eccentricity: 0.0013548
Arg of perigee: 307.1873 deg
Mean anomaly: 52.8011 deg
Mean motion: 13.16822717 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9309
Checksum: 298

/EX
SB KEPS @ AMSAT $ORBS-205.M
Orbital Elements 205.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX July 24, 1993
BID: $ORBS-205.M
TO ALL RADIO AMATEURS BT

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93202.72201235
Element set: 149
Inclination: 28.4702 deg
RA of node: 201.6924 deg
Eccentricity: 0.0004620
Arg of perigee: 49.8483 deg
Mean anomaly: 310.2527 deg
Mean motion: 14.92764691 rev/day
Decay rate: 4.01e-06 rev/day^2
Epoch rev: 17668
Checksum: 273

Satellite: GRO
Catalog number: 21225
Epoch time: 93203.68922503
Element set: 945
Inclination: 28.4617 deg
RA of node: 37.7472 deg
Eccentricity: 0.0006559
Arg of perigee: 340.0746 deg
Mean anomaly: 20.0141 deg
Mean motion: 15.74016493 rev/day
Decay rate: 2.0228e-04 rev/day^2
Epoch rev: 571
Checksum: 271

Satellite: TUBSAT
Catalog number: 21577

Epoch time: 93202.22134203
Element set: 267
Inclination: 98.4712 deg
RA of node: 277.3341 deg
Eccentricity: 0.0005343
Arg of perigee: 194.9997 deg
Mean anomaly: 165.1031 deg
Mean motion: 14.36384974 rev/day
Decay rate: 2.0e-07 rev/day^2
Epoch rev: 10552
Checksum: 282

Satellite: SARA
Catalog number: 21578
Epoch time: 93201.76528633
Element set: 437
Inclination: 98.4773 deg
RA of node: 278.6625 deg
Eccentricity: 0.0004689
Arg of perigee: 188.9829 deg
Mean anomaly: 171.1269 deg
Mean motion: 14.38478161 rev/day
Decay rate: 3.36e-06 rev/day^2
Epoch rev: 10555
Checksum: 345

Satellite: UARS
Catalog number: 21701
Epoch time: 93200.01088054
Element set: 250
Inclination: 56.9851 deg
RA of node: 53.9191 deg
Eccentricity: 0.0005151
Arg of perigee: 111.3468 deg
Mean anomaly: 248.8116 deg
Mean motion: 14.96716847 rev/day
Decay rate: 3.225e-05 rev/day^2
Epoch rev: 10106
Checksum: 267

Satellite: FREJA
Catalog number: 22161
Epoch time: 93200.02067341
Element set: 141
Inclination: 63.0018 deg
RA of node: 55.2777 deg
Eccentricity: 0.0770836
Arg of perigee: 285.6210 deg
Mean anomaly: 66.1091 deg
Mean motion: 13.21648330 rev/day
Decay rate: -7.1e-07 rev/day^2

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Epoch rev: 3776
Checksum: 257

/EX
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57. SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-24 19:50:47 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Jul24.195047.12141@scorch.apana.org.au>
Source record: 28716
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

PLEASE SUBMIT YOUR TRIVIA TO THIS LIST! ANY ITEM AT LEAST REMOTELY
RELATED TO SPACE IN ANY WAY IS APPROPRIATE FOR THIS LIST!

Well bugger it, I'm combining the update in with the trivia list so I
only have to post one file. We've got a couple of those Kettering Trivia
items, so this week we're posting to radio.amateur.space group as well. Just
this once though, unless we can get some more amateur radio trivia...
We've rattled the English magazine Space Flight News and come up with
quite a few new items. The number we have produced, and collected from
submissions since the last post, have just about doubled the size of the
list. I'm not sure if we can keep this pace up, but it would be nice if
we could.
Our local NSS chapter is going on a Trivia collection crusade, so if
there is any one else who makes a submission from an NSS chapter, please
let us know because we'd like to know what chapter you are from.

Greetings to those who have submitted, and also Ray Dodds. You won't
believe the size of this one Ray!

****

Changes to July 24th Posting:

Trivia: 1a, 20a, 36a, 36b, 37a, 41, 43a, 53..114
Rumors: 5
Speculation/Questions: 5..10

****

##
# #
SPACE TRIVIA LIST
# #
##

Masterminded by:- THE NEWCASTLE SPACE FRONTIER SOCIETY
Temporarily Moderated by:- Luke Plaizier

PLEASE DIRECT YOUR SUBMISSIONS TO:-

EMAIL: lukpla@scorch.apana.org.au

snail mail: Luke Plaizier
c/o Newcastle Space
Frontier Society
PO Box 1150
Newcastle NSW

Australia 2300
Direct Voice: International - 61-49-54-7454
Inside Australia - 049-54-7454
Answering Machine - 61-49-63-5037

****

This is the list of Trivia information recorded in just over 25 years
of human activity in space. In no way is this an official list of events nor
is it guaranteed that all information included in this file is accurate or
true.
This file has come about due to the happy donations of time and
information of people on the internet located at various sites world wide,
and represents a collection of information that many of them have either
found interesting themselves, or would otherwise believe that other people
might find interesting.
The MOST important thing about this is that we'd like it to be built
by the input of many people, so if you can

PLEASE DONATE SOME TRIVIA AND WE WILL ENDEAVOUR TO ENSURE THAT IT
IS INCLUDED IN THIS FILE.

Submission details are included in the trailer to this list.

****
****
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and Unmanned*
* Spaceflight from anywhere around the Globe. *
* *
****
****

(1) Even though Yuri Gagarin, on the first manned spaceflight, ejected
from his Vostok capsule just before landing, the official Soviet
report said otherwise for fear that the rest of the world might
not recognise the mission as a complete success.
(1a) The Federation Aeronautic International, the governing body for
aerospace records has rules specificially stating that the pilot
must be in control of the craft from take-off to landing. Vostok
cosmonauts ejecting clearly violated the rule so it was hidden.
See my book "Almanac of Soviet Manned Space Flight" for details.
Available from Zenith Books 800-826-6600.
[From dennisn@ecs.comm.mot.com]

(2) Radio frequencies in interstellar space between 1420 and 1720 MHz
are known as 'the water hole', as it is thought that alien
civilisations might converge and commune in radio frequencies
in this band of 300MHz. (1420 = Emission line of neutral
Hydrogen, 1720=same for Hydroxyl and together these two make
water.) [BIS, SPACEFLIGHT, Vol. 35, No. 4]

(3) In one day, SETI searchers at Puerto Rico and California, using
the new Targeted Search's Multi Channel Spectral Analyzer,
sifted through more information than had been collected on all
previous SETI efforts combined.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(4) Silicon Engine's new Targeted Search's Multi Channel Spectrum
Analyzer, developed for a 10 year NASA-funded SETI, is capable
if listening in on some 15million frequency channels, some
with a bandwidth of as little as 1Hz.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(5) The engines of the escape tower on the Apollo moon missions (on top of
the mighty Saturn V) were more powerful than the entire Redstone
launcher that put the first American into sub-orbital space.
[Paul.Keinanen@Telebox.tele.fi, steven@spri.levels.unisa.edu.au]
(5a) The Apollo LES (Launch Escape System) thrust was 654 kN, while the
Mercury-Redstone thrust was 347 kN. The Apollo CM mass was about 5800
kg and the LES mass was 4000 kg or about 10000 kg combined. The
accelleration would be about 65 m/s/s or about 6.5 G. As the maximum
accelleration during ascent for Apollo-Saturn V was about 4 G,
the CM+LES combination could still be separated, even if
the Saturn V engines would still be running at full thrust.
(5b) The engines on the Launch Escape Tower (LES) of the Saturn V are
indeed more powerful than the engines used on the Mercury-Redstone
booster. From [1], the LES has a thrust of at least 654 kN (147 klbf)
(Another figure of 689 kN (155 klbf) is also mentioned in [1]. The lower
figure may be the total downwards thrust since the engines have to
point at an angle to avoid burning up the Command Module if used.)
The Mercury-Redstone has a thrust of 347 kN (78 klbf) [2].
[1] M. Wilson, "Moon landing," Flight International, pp. 208-221,
6 Feb. 1969.
[2] K. Gatland, "The illustrated encyclopedia of space technology,"
Landsdowne Press, Sydney, 1981.

(6) March 19, 1959
"The Dept. of Defense announces that three atomic blasts were
detonated in space during 1958 as part of Project Argus using modified
X-17 rockets."
[-Eugene Emme, ed., _Aeronautics and Astronautics, p. 107.]

(7) Hey, I don't know if you'll include this in your list of trivia but
it surely is amusing. After each launch countries are required by
treaty to announce the launch. There are no requirements about what
the contents of the announcement are. Shown below is a Chinese
announcement from 1975. It is mostly propaganda. Did you know that
launching a satellite refutes Confucius?
(Actual transcript has been shortened for space considerations.)

((TEXT) PEKING, DECEMBER 17, 1975 (HSINHUA) -- CHINA
SUCCESSFULLY LAUNCHED ANOTHER MAN-MADE EARTH SATELLITE ON

DECEMBER 16, 1975, UNDER THE GUIDANCE OF CHAIRMAN MAO'S
REVOLUTIONARY LINE, ON THE BASIS OF THE VICTORY IN THE
GREAT PROLETRAIAN CULTURAL REVOLUTION AND THE MOVEMENT
TO CRITICIZE LIN PIAO AND CONFUCIUS, AND IN THE EXCELLENT
SITUATION CHARACTERIZED BY CONSISTENT NEW VICTORIES IN
THE SOCIALIST REVOLUTION AND SOCIALIST CONSTRUCTION.
THE SATELLITE IS FUNCTIONING NORMALLY.
THE SUCCESSFUL LAUNCHING OF THE SATELLITE IS A NEW
ACHIEVEMENT MADE BY THE PEOPLE OF THE WHOLE COUNTRY,
UNDER THE LEADERSHIP OF THE PARTY CENTRAL COMMITTEE
HEADED BY THE GREAT LEADER CHAIRMAN MAO, IN TAKING CLASS
STRUGGLE AS THE KEY LINK, CONTINUOUSLY CONSOLIDATING
AND DEVELOPING THE FRUITS OF THE GREAT PROLETARIAN
CULTURAL REVOLUTION, AND FIRMLY CARRYING OUT THE SERIES
OF IMPORTANT INSTRUCTIONS OF CHAIRMAN MAO'S INCLUDING
THOSE ON STUDYING THE THEORY AND COMBATING AND PREVENTING
REVISIONISM, ON PROMOTING STABILITY AND UNITY AND ON
PUSHING THE NATIONAL ECONOMY FORWARD. IT IS A FRESH
SUCCESS ACHIEVED BY ADHERING TO THE PRINCIPLE OF
INDEPENDENCE AND SELF-RELIANCE, BRINGING INTO FULL PLAY
THE INITIATIVE OF BOTH THE CENTRAL AND LOCAL AUTHORITIES,
UNIFYING PLANNING, WORKING ENGERGETICALLY IN CLOSE
COORDINATION, WAGING A UNITED STRUGGLE AND GRASPING
REVOLUTION, PROMOTING PRODUCTION AND OTHER WORK AND
PREPAREDNESS AGAINST WAR.
THE CENTRAL COMITTEE OF THE COMMUNIST PARTY OF CHINA,
THE STATE COUNCIL AND THE MILITARY COMMISSION OF THE
CCP CENTRAL COMMITEE EXTEND WARM CONGRATULATIONS
TO THE WORKERS, COMMANDERS AND FIGHTERS OF THE PEOPLE'S
LIBERATION ARMY, SCIENTIFIC WORKERS, ENGINEERS AND
TECHNICIANS, REVOLUTIONARY CADRES AND MILITIAMEN WHO
HAVE BEEN ENGAGED IN THE RESEARCH, MANUFACTURE AND LAUNCHING
OF THE SATELLITE AND OTHER PEOPLE CONCERNED. 170110 UTT NY 17/O1224Z

(8) Neil Armstrong and Buzz Aldrin, the first men on the moon, almost
crashed onto the lunar surface. The Eagle's descent engine had
about 10 seconds of fuel left when they landed.
[From yantosca@bu.edu]
(8a) "The Eagle had landed on a countdown to abort, primarily because
propellants were sloshing away from intakes and meters, giving off
readings that the ship had entered the dead-man zone with its tanks
running dry."
[Submitted by davem@ee.ubc.ca, clarifying that although correct at
the time, post-flight analysis uncovered this problem, meaning
incorrect readings from the meters.]

(9) The maiden launch of the first Space Shuttle, "Columbia", occurred
on April 12, 1981, 20 years to the day of Yuri Gagarin's "Vostok"
flight.
[From yantosca@bu.edu]

(10) In 1963, the Soviet Union tried to launch a rocket (from Baikonur??)
but the main engine didn't fire. Several technicians were dispatched
to the launch pad to correct the problem, under the command of an
engineer/officer whose last name was Nedelin. Somehow, the
second stage engine fired, causing a massive explosion while the men
were still on the launch pad. It is estimated that more than 100 of
the Soviet Union's best rocket engineers and technicians (including
Nidelin) perished on that day. Ironically, there was one survivor;
he ducked into a fireproof box on the launch pad to smoke a cigarette
and was shielded from the blast. The loss of so many engineers and
technicians was a serious setback to the Soviet Space program; this
may have been one of the reasons why the Soviets did not reach the
Moon before NASA did.
[From yantosca@bu.edu, sourced from "AIR & SPACE / Smithsonian"]
(10a) The best account to date is in Rabochna Ya Tribuna, Dec. 6, 1990, p.4
"Top Secret: Explosion at Baykonur Cosmodrome: Only after 30 years are
we learning the truth about the death of Marshal Nedelin and a large
group of rocket speciallists", FBIS-UPS-91-002 from NTIS.
The author says numbers are still not known but range from 165
to 200 deaths. Happened Oct. 24 1960, Nedelin was the head of the
Strategic Rocket Forces (all ICBM's, launch crews, etc..). More than
one person survived, the rumor of the one survivor is that it was
Cheif Designer S Korolev, but this is unlikely. But it was not
his rocket design and he should have had no reason to be there. The
cause is speculated to be the failure of circuit isolation during
electrical testing actually sent the signal for the 2nd stage of the
SS-7 to fire after repairs were made. The reference above has a good
account of the fire by a man who was blown 30 meters by the blast
and survived. Flim of the fire is available.
*NOTE: We'd like to thank the poster of this submission for his quick
response for our request for more information.

(11) This is actually several combined into one, as they are from the
same source. They are fact, but the exact source is unknown at
the moment. Could the owner please step forward?
(a) 2 SSME's could generate as much power as that used by a NIMITZ class
aircraft carrier.
(b) The Fuel and hydrogen pumps of 3 SSME's combined could generate as much
power as that used by the battleship IOWA plus 12 ETHAN class
submarines.
(c) One SSME has enough thrust for 2.5 Boeing 747's.
(d) The combustion in 3 SSME's combined, to make one shuttle flight
system, releases more energy than the combined nuclear
power plants of 9 non-US countries. (but which ones?)
(e) The turbo-pumps on the SSME rotate at 37,000 rpm. Formula One
engines can rotate at up to 15,000 rpm. A standard 1990's
vintage motor vehicle is very lucky to rev to 10,000rpm.

(12) The LOX turbopumps on the F-1 engines of the Saturn V booster delivered
24,811 gallons of LOX per minute. They could have filled a swimming
pool 25 feet long, 10 feet wide, and 6 feet deep in about 27 seconds.
(In metric, the pumping rate is about 94,000 liters per minute, and the

example swimming pool is 7 meters long, 3 meters wide, and 2 meters deep. The 27 seconds stays the same.)
[Source: "Apollo: The Race To The Moon", Charles Murray and Catherine Bly Cox, Simon and Schuster, New York, 1989, ISBN 0-671-61101-1, submitted by gbt@zia.cray.com]

(13) (This one is specific to 1993) Although june 21, the summer solstace in the Northern hemisphere is the longest period of daylight, July 1 was the longest day of the year worldwide! That is because at Z 00.00 (midnight world standard time) a leap second was added making July 1 24h00m01s long.....the longest day of the year!
[jbear@telerama.pgh.pa.us]

(14) Astronaut charm school included teaching the boys what socks to wear with which pants and shoes.
[mark.blevis@qmail.dgrc.doc.ca]

(15) After the first spacewalk, the Voshkod capsule carrying Alexei Leonov and Pavel Belyayev went off course and came down in the middle of a forest in Siberia. The two cosmonauts spent the night waiting for rescue in the snow, huddled around a fire in their spacesuits, listening nervously to wolves howling in the woods around them.
[Reference: Several sources, notable James Oberg's `Red Star in Orbit'
From alien@acheron.amigans.gen.nz]

(16) "A typical Perseid meteoroid that produces a visible meteor of magnitude 2.5 has a mass of around *2.5 milligrams* and a velocity of order *60 kilometres per second*. Such a meteoroid would inflict severe damage - a crater of 5 cm diameter has been estimated - if it struck an artificial satellite."
[RANDALLJC@UK.AC.PORTSMOUTH.CSOVAX]

(17) The Apollo 13 moon mission was launched precisely on schedule, 13:13 Houston time, April 11, 1970. On April 13th, en-route to the moon, an oxygen tank in the service module exploded. The crew got home safely thanks to the consumables and propulsion of the LM, and the ingenuity of ground controllers in improvising LM lifeboat procedures. The S-IVB stage which boosted the mission into translunar trajectory was delivered to Kennedy Space Center on June 13, 1969--Friday.
[Apollo Expeditions to the Moon, NASA SP-350, Chapter 13; Stages to Saturn, NASA SP-4206. From kelvin@autodesk.com]

(18) For a Motor Vehicle Engine to have the same power-to-weight ratio as one Space Shuttle Main Engine, then it would only have to be the size of your clenched fist. [SHUTTLE, Nigel MacKnight.]

(19) The Liquid Hydrogen Turbo-Pumps on a Space Shuttle Main Engine weigh as much as a standard V8 Motor Vehicle engine, but output some 310 times the power. [SHUTTEL, Nigel MacKnight.]

(20) The Apollo 12 moon mission in 1969, following closely on the heels of the Apollo 11 mission, was struck by a bolt of lightning just after it left the launch pad.

[SHUTTLE, Nigel MacKnight.]
(20a) Atlas-Centaur AC-67, launched on March 26, 1987, was hit by lightning and started to deviate from it's planned course some 49-seconds after lift-off. Range Safety officials destroyed the vehicle.
[Space Flight News, May 1987]
{If anyone has record of any-other lightning strike, then let us know because it belongs here!}

(21) The VAB, where Space Shuttle components are assembled today, and Saturn V components were assembled in the 60's and 70's, occupies a ground area of 8 acres and boasts an internal volume of 3,624,000 cubic metres (129,428,000 cubic feet!) The structure was designed to withstand winds of 200km/h (125 mph) and has a foundation that rests on more than 4200 steel pilings 40 cm (16 in) in diameter that each go to a depth of 49 metres (160 ft) through bedrock. The building has it's own internal weather!
[SHUTTLE, Nigel MacKnight.]

(22) There was an aluminium shed near launch pad 39A. It was roughly 50 yards away from the perimeter. It was a prefab building and it wasn't determined whether it would stand up to the first launch of the shuttle or not. After the first launch of Columbia, the shed was reduced to a few pieces of debris scattered across the ground.
[SHUTTLE, Nigel MacKnight.]

(23) Noticeboard of Safety requirements inside the VAB:-
REMOVE PERSONAL ITEMS FROM THE UPPER POCKETS. WEAR BADGES INSIDE SHIRT OR CARRY IN PANTS POCKET. REMOVE WATCHES AND RINGS OR TAPE SAME. EYEGLASSES MUST BE TETHERED. ACCESS RESTRICTED WITHIN THREE FEET OF VEHICLE-CONTACT ACCESS CONTROL MONITOR. FOOD AND BEVERAGES PROHIBITED. FLAMMABLE LIQUIDS MUST BE APPROVED. NO HARD HATS ALLOWED.
[SHUTTLE, Nigel MacKnight.]

(24) I worked at the Johnson Space Center, and during a material testing procedure on Space Suit Assemblies I got to play with a heat-soaked shuttle tile cube. It was a one-inch cube, and it was soaking in an oven at about 1400F. We took it out of the oven with tongs and then you could hold it by the edges, preferably the corners. You did not want to touch the face of it - by minimizing the surface that you were in contact with you could minimize the heat transfer.
It glows (visibly) just a little, but it sure shows up on infrared Kokak slide film :-)
[From jgladu@bcm.tmc.edu]

(25) The Software programmes controlling the Shuttle's on-board computers are the most sophisticated programmes ever developed for a spacecraft, and contain over 500,000 IBM-written instructions. This is twenty five times more than the programmes developed for the Saturn

launch vehicle which guided Apollo astronauts from launch, through
orbital insertion and into lunar trajectory.
[SHUTTLE, Nigel MacKnight.]

(26) John F. Kennedy Space Centre, or KSC as it is more usually referred to,
is situated on Cape Canaveral. The operational areas are located
adjacent to Mosquito Lagoon. Visitor's soon find out that the
lagoon did not receive it's name frivolously, and that a reliable
brand of mosquito repellant can be worth it's weight in gold!
[SHUTTLE, Nigel MacKnight.]

(27) And then there are the Alligators at KSC. Many of the 'gators have
become quite tame, and some have developed the habit of clambering
out of the pond in front of KSC's large canteen facility to 'beg'
for scraps of food from the office workers who eat their lunch
outside on the lawn.
[SHUTTLE, Nigel MacKnight.]
(27a) This is a big problem at KSC (Not "The Cape" as many call it...)
because alligators are REALLY stupid. They can't tell the difference
between a sandwich or your hand...In fact to them there IS no
difference. We are warned over & over in the "KSC bulletin" not to
feed them. Since KSC is a nature preserve, it is illegal to feed
the 'gators. If caught, you can be disciplined. When the alligators
lose their fear of humans, they are caught and moved to a remote part
of the preserve. If they come back the alligators are killed. Period.
[From HOLLIS@TITAN.KSC.NASA.GOV]

(28) The oxygen tank of the External Tank of the Space Shuttle
Transportation System occupies a small section at the front of the
tank, whilst the Hydrogen Tank occupies the rest below it. The
Hydrogen Tank is 2.5 times larger than the Oxygen tank, but weighs
only one-third as much when filled to capacity. This difference
comes about because liquid oxygen is some sixteen times more dense
than liquid hydrogen.
[SHUTTLE, Nigel MacKnight.]

(29) The Crawler-Transporter, which carries the Space Shuttle, and
previously the Saturn series of launch vehicles from the VAB to
one of either launch pads 39A or 39B, is as wide as a 12 lane
highway.
[SHUTTLE, Nigel MacKnight.]

(30) There are eight sets of tracks on each Crawler Transporter - two in
each corner - and each set of tracks is comprised of fifty seven
segments weighing one-ton apiece. That totals up to over 450 tons
in track segments alone!
[SHUTTLE, Nigel MacKnight.]

(31) The Crawler Transporter isn't exactly good where fuel economy is
concerned. Travelling at the rate of a mere 1 mile per hour, it
guzzles fuel at the rate of of one gallon every twenty feet! Instead
of Miles per Gallon, it is measured in Gallons per Mile!

[SHUTTLE, Nigel MacKnight.]

(32) On July 20, 1969, Houston Mission Control put through the longest-distance telephone call in history. It connected Richard Nixon to the two astronauts, Armstrong and Aldrin, on the surface of the moon.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(33) The Apollo Spacecraft, which carried astronauts to and from the Moon, had nearly two million working parts. A large Motor Vehicle has less than 3,000.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(34) Initially scheduled to be called "Constitution", the first Space Shuttle orbiter, OV-101, was renamed "Enterprise" in deference to "Star Trek" television series fans.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(35) There is another unknown orbiter in the Space Shuttle fleet. Tagged OV-098, the craft itself was named "Pathfinder". It's original role was as a rough dimension-and-weight mock-up for practising de-orbit operations on the run-way, and also to practise lifting and handling the orbiter at various facilities (Shuttle Carrier Mate De-Mate, VAB and OPF). The vehicle was heavily modified to eventually look like the other orbiters for the "Great Space Shuttle Exposition" scheduled for June 1983 to August 1984. The craft was returned to MSFC and is on display today, with Filament wound boosters and the tank used in the main propulsion tests (MPTA-ET) at the Space and Rocket Center near Hunstville.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(36) The Soviet Voskhod spacecraft, in follow-on to Vostok flights, was essentially just a one-manned Vostok spacecraft. All three cosmonauts launched in the spacecraft were without spacecsuits. Officially this was reported to be because the Soviets were confident with the spacecraft, but a quick calculation reveals that there would not have been enough room for the three men if these spacesuits had been included!
[The Soviet Manned Space Programme - Salamander Books]
(36a) The real trivia here I believe is the fact Korolevs engineers did not want to make the modification believing it a bad idea, then Korolev offered to fly one of the engineers on the first flight and they accepted the mission, Feoktistov was the lucky engineer. This was really part of Korolevs plans to get speciallists into space to learn and stop all flights from being all military pilots. Journalists were also selected for Voskhod missions.
[dennisn@comm.mot.com (Dennis Newkirk)]
(36b) This was repeated with Soyuz, stuffing three people without pressure suits into a spacecraft designed for two with suits, resulting in the deaths of the Soyuz-11 crew when the spacecraft vented its atmosphere during reentry. After that all crews have worn pressure suits even when (from Soyuz-12 to T-5) this reduced the crew size from three to

two.
[Mark Grant <mark@isltd.insignia.com>]

(37) The Soyuz spacecraft was initially designed by the Soviets for their attempt at getting to the Moon before the Americans. But the orbital Module of the Soyuz spacecraft was missing one vital component - a transfer tunnel in the docking adapter. If it ever became necessary to transfer crew or equipment to a Lunar orbiter or Lander, then cosmonauts would have had to climb into suits and go into the vacuum of space! The docking tunnel was added for later space-station operations.
[The Soviet Manned Space Programme - Salamander Books]
(37a) The lunar module docking drouge was just a metal honeycomb type crushable receptical for the LOK (lunar Soyuz) probe which just plunged into the material and hung on. It's only used once per mission anyway.
[dennisn@comm.mot.com (Dennis Newkirk)]

(38) The EDO (Extended Duration Orbiter) toilet is indeed different from a standard shuttle toilet. The standard shuttle toilet has a bowl that is used to contail fecal wastes. The waste material is freeze dried when it enters the bowl. The current toilet is able to support flights of up to 13 to 14 days. Modifications to the toilet are expected to increase this to about 16 days. The EDO toilet (This is the one making all the headlines about cost overruns) has just had the qualification unit complete its second flight. The 23 million dollars only produced a qualification unit. NASA has not purchased any actual flight units yet. The EDO toilet is different in that in place of the bowl there is a canister that is used to collect fecal wastes. Each canister can support 23 to 27 uses depending on what else the crew throws down there. When the canister fills up, it is replaces with a fresh canister. The drawbacks to this toilet are that the canisters require a lot of storage space that is not required by the standard toilet. The standard toilet has been in use since STS-1, while the EDO toilet is undergoing testing on OV-105 only. The standard toilet must be removed from the vehicle after each flight and returned to JSC for cleaning and processing. The EDO toilet can remain in the vehicle and thus saves processing time.
[From oliver@vf.jsc.nasa.gov. This item came about in the discussion pertaining to the legitimacy of #5]

(39) Some western speculators, back when the Soviets were still in the race to beat the US to the moon, were wondering what the Soviets would use as a lunar lander, as they could not (until recently) find evidence of a separate lunar lander vehicle. They came up with the concept that an enhanced Soyuz, complete with landing legs, would be used to land vertically on the surface of the moon, and even used the re-positioning of the main hatch to verify this! This would mean that a cosmonaut would have had to descend a ladder some 2 stories high to get to the Lunar Surface!
[The Soviet Manned Space Programme - Salamander Books]

(40) In the early 80's, the soviets were flying small 'cosmos' experimental vehicles which confounded international observers. Cosmos 1374, launched in June of 1982, was recovered in the Indian Ocean. The soviets issued a standard Cosmos-type announcement, failing to include an orbital period, yet stating that the mission was a success. The next similar flight, cosmos 1445, came nine months later. The retrieval of this one, simlarly with 1374, was observed by the Royal Australian Air Force, but in this case photographs were released to the rest of the world, revealing that the soviets had been testing a a small winged orbiter, with demensions of 3.4m length, 1.4m fuselage diameter and a wingspan of 2.6m.
There are two more interesting notes. Firstly, Cosmos 1374, unlike 1445, did not have any identifying national markings, indicating that the RAAF was an undexpected visitor to the retrieval area. Secondly, the reovery ship (the Yamal) and apparently many members of the the Soviet recovery team, were the same for both spacecraft retrievals. There is one man with an identical head of Afro-styled hair who appears in both photographic series of the retrieval sequences, despite the two missions happening 285 days apart!
[The Soviet Manned Space Programme - Salamander Books. Peter Pesavento, Correspondence to the BIS Spaceflight magazine, Sept 1991.]

(41) The soviets had a large Saturn V type booster in development for the soviet manned assault on the Moon. This launcher was designated by many names, namely by G-1 or G-1e in the west in early years, but now as the SL-15 or N-1 booster). By mid 1966, US reconnaissance satellites spotted test facilities under construction at Tyuratam. By 1968 static test models had been built and between March and April a full sized version was moved from it's fabrication area to the launch pad and back.
[The Rocket - David Baker - New Cavendish Books.]

(42) The attempts to launch the G-1/N-1/SL-15 soviet booster are:-
(a) February 21, 1969: The booster exploded 70 seconds after lift-off, when a fire developed in the tail section of the rocket. The booster was labelled 3L, and had an L-1 Zond Spacecraft.
(b) July 3, 1969: A liquid oxygen pump failed causing an explosion that wrecked the launch site. Designated 5L, this booster is assumed to have had the same payload and launch aim as the first, namely to enter an orbit to the moon and attempt a lunar flyby.
(c) July 21, (Or June 27?) 1971: The rocket fell back on the launch pad causing more extensive damage.This launcher, designated 6L, had a mock-up of the lunar module, lunar lander and escape system.
(d) November 23, 1972: A fire developed in the engine compartment close to the end of the 1st stage burn and the booster exploded after 107 seconds of flight. Designated 7L, it had a proper lunar orbit module and escape system and a mock-up lunar landing module. It was planned this would be an Apollo 8 style, but unmanned, lunar flyby.
[BIS Spaceflight, June 1991 and June 1992]

(43) The one remaining G-1/N-1/SL-15 heavy lift booster (the fifth in the
series that were built), which did not get a chance to fly due to
the cancellation of the program, was partially converted
into a bandstand for a town close to the launch site.
[BIS Spaceflight, June 1991]
(43a) The 8L booster was nearing a 1974 launch date. Another booster
was also being readied, parts for more were on hand. All assembly
was done at Baykonur. There was growing confidence these boosters
would perform better since significant modifications were made
from the 4th launch onward.
[dennisn@comm.mot.com (Dennis Newkirk)]

(44) There were several things to mention about Helens Sharman's flight to
the MIR space station on May 18, 1991.:-
(a) Great Britain was the 22nd nation to fly a citizen into space
(b) Helen Sharman was the joint 248th person in space
(c) She was the 15th woman into space
(d) For the first time a nation's first space traveller was a woman.
(e) She was the first non-soviet, non-amerian woman into space.
(f) One record that was just missed: because the American Space
Shuttle Columbia was delayed from it's scheduled launch
date of May 22, the chance to set a new record or 4 women
in space simultaneously was lost. (This was sts-40, which
finally took off on June 5th.)
[BIS Spaceflight, July 1991]

(45) Gagarin's flight began under a cover of secrecy. Nobody except the
heads of Korolev's design bureau and the KGB knew of the place of
landing. The inhabitants of Saratov could not even have suspected
how close they were to the historic landing site.
But the secrecy wasn't complete. Skilled workers were required
to deal with measuring and other devices to dismantle them. These
workers were taken by KGB agents from one of the nearby plants. They
were told by the director of the plant that they were close to the
landing site of Vostok.
One of the workers had a camera and was able to take a clear
photograph of Vostok that wasn't released until 1991!
[BIS Spaceflight, August 1991. And they show the photo!]

(46) The Lunar Landing Research Vehicle, developed to train US astronauts
on how to control the Lunar Lander for flights to the moon, was
a strange contraption built with a turbofan engine facing down
vertically in the centre to provide vertical thrust with a weight
distribution and throttle reaction time similar to that of the
real Lunar Lander. It was based around the early VTOL 'Flying
Bedsteads' developed to study the potential of Vertical Take-Off
and Landing for jet aircraft.
[Ed Henegveld, BIS Spaceflight, December 1992]

(47) Neil Armstrong had a close brush with death in a 'flying bedstead'
LLRV on May 6th, 1968, when the craft went out of control and he
was forced to eject. He landed by parachute and walked away without

injury!
[Ed Henegveld, BIS Spaceflight, December 1992]

(48) Yuri Gagarin, on the maiden launch of a man into space, landed in a field some 26km south-west of the town of Engels in the Saratov Region. In his orange flight-suit he approached a woman and a little girl with a calf. The cosmonaut was asked if he came from space. And of course he replied "As a matter of fact, I have!"
[Neville Kidger - BIS Spaceflight, April 1991]

(49) Compared with the desired profile, the edge of the mirror surface of the primary mirror on the Hubble Space Telescope is too low by 0.002mm. This results in an error where the Light from the edges of the mirror come to a focus about 38mm beyond where the innermost rays converge.
[BIS Spaceflight, April 1991]

(50)The US Army Redstone missile has had a long and ditinguished service record.
(a) A modified redstone, redesignated Jupiter C or Juno 1, sent into space the United States first satellite - Explorer 1 - on January 31, 1958.
(b) It was used for the first manned American spaceflights of Shepard and Grissom in 1961.
(c)It was the first rocket to detonate an atomic weapon (Project Hardtrack in 1958) above the Earth's surface.
(d) It was the launcher used in Project SPARTA, a joint US/UK/Australia programme of re-entry research. The last of the 10 Redstones shipped to Australia for the project was used to launch WRESAT, Australia's first satellite.
[Keith Scala, Michael Crowe, BIS Spaceflight, August 1991.]

(51) The first real watch to be worn in space (Yuri Gagarin had a timepiece which was not a true Chronograph) was in July 1962, when Scott Carpenter flew the Aurora 7 Mercury capsule.
[Alan A Nelson - BIS Spaceflight, April 1992]

(52) The Omega Speedmaster Professional, later to become standard issue to all Gemini, Apollo and Skylab Astronauts, was first flown by Wally Schirra aboard Sigma 7 in October 1962. This watch was later known as the "Moon Watch" as it was the first watch worn on the Moon.
[Alan A Nelson - BIS Spaceflight, April 1992]

(53) The television series 'The Six Million Dollar Man' showed a terrible aircraft accident at the beginning of each episode, supposedly indicating how 'Steve Austin' was injured. The actual sequence was of a real accident on May 10, 1967, when NASA test pilot Bruce Peterson was fortunate to escape with his life in an experimental aircraft known as the M2-F2 lifting body. This small craft was part of a development to test the aerodynamics of small wingless craft that could generate aerodynamic lift through the simple shape of it's body. They came thundering down at incredible speeds,

and attribute much of the information that is required today for
the onc-attempt-only langings made by the Space Shuttle.
[Space Flight News, May 1986. (No longer Published.)]

(54) The Apollo 10 crew of Tom Stafford, John Young and Gene Cernan put
themselves in the record books by achieving the highest speed ever
attained by man - 24,790mph.
[Space Flight News, July 1986. (No longer Published.)]

(55) The Lunar Rover, as used on Apollo missions 15, 16 and 17, had a
lifetime of 78 hours, and could cover up to 92kms. It could carry
up to 400kg (Earth weight) - more than TWICE its own weight. (An
average family car can usually only carry half it's own weight). Fully
loaded it could climb a 25 degree slope, and on the flat it could
reach a top speed of 16km/hr. It would be an almost precise 1/6th
slow-motion replay of a car going 86km/h on Earth!
[Space Travellers Handbook, Michael Freeman, Sovereign Books.]

(56) A 'logical lock' was in use on the Vostok spacecraft to lock out any
actions that Yuri Gagarin might make in a panic. At that time, nobody
knew how a human would react to space, so the logical lock idea was
created. Yuri Gagarin had a small envelope in which the logical lock
code was written, and in order to use the controls he would have to
prove that he was capable of doing the simple task of reading the
combination and punching 3 of nine buttons.
[Space Flight News, November 1986. (No longer Published.)]

(57) There is a slide wire 'flying fox' type system at both launch
pads 39a and 39b that the astronauts can use in the event of
en emergency at the launch pad.
[Space Flight News, February 1987]

(58) At the base of the slide wire system used for emergency astronaut
escapes at pads 39a and 39b, is a modified military M113 tank
used to evacuate the atronauts and support personnel from the
vicinty of the launch pad in a protective environment. In
actual fact there are 3 tanks. One near the base of the
slide wire, one at the blast demarkation line some 4,485ft
from the launch pad, and another three miles away in the
hands another fire/rescure team.
[Space Flight News, February 1987]

(59) The military has a long history of starting and then dropping astronaut
and other manned programs - such as the Manned Orbiting Laboratory,
the Dyna-Soar, etc.
The latest one was the Manned Spaceflight Engineer program -
and it did succeed in getting two Air Force payload specialists onto
the Space Shuttle. Gary Payton (STS-51C) and Bill Pailes (STS-51J)
flew before the Challenger accident.
After Challenger the whole program was reconsidered and
the military decided to concentrate on unmanned launch vehicles. The
MSE program was disbanded and the people reassigned.

The person who had probably the best chance of flying next was
Kathy Roberts - but the Air Force dropped the program before she flew.
[from CHARLES D. PHILLIPS]

(60) The Johnson Space Center in Houston has two control rooms where
technicians can monitor the Shuttle's onboard systems. The original
control and display consoles in these rooms (dating back to the mid
1960's and the Gemini program) are still in use today. In the near
future these consoles will be replaced with modern computer
workstations.
[Tour Guide, Johnson Space Center, Houston TX
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(61) Both of the control rooms at JSC have a viewing gallery behind a
wall of one-way glass. These viewing galleries are open to the public
on days when the Space Shuttle is NOT in orbit (for security reasons).
In fact, the galleries are closed to the public 24 hrs before launch
time. However, VIP's (the President, Senators, Congressmen, and
visiting dignitaries) occasionally are present to watch the progress
of a Shuttle mission from these galleries.
[Tour Guide, JSC from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(62) The first time four spacecraft had ever been docked together cae on
22nd April, 1987, when the Russians had together Soyuz-TM2, Mir,
Kvant and Progress 29.
(I have the suspicion that this may have been surpassed by now with
the addition of other Mir modules. Could anyone provide
details on this?)
[Space Flight News - May 1987]

(63) On the first four flights of Columbia, there were only two crew
members, the Commander and the Pilot. Each was launched seated in a
modified version of the rocket ejection seat installed in the SR-71
'Blackbird'. This seat could safely eject them away from the Orbiter
in case the control system should malfunction and send it out of
control.
[Bob Overmyer, Space Flight News, May 1987]

(64) Originally it was thought that the shuttle ejector system could be
used to eject from the launch configuration as long as the Shuttle
system was below 100,000 feet, but it was discovered later that
once the solid rocket motors were burning, a crewmember ejecting
would decend into the rocket plume.
[Bob Overmyer, Space Flight News, May 1987]

(65) Crew safety concerns for the shuttle heightened when the results of
the ditching tests conducted at the U.S. Navy David Taylor Model
Basin become known. At the Taylor test facility, large-scale models
of the Orbiter were catapulted over a long water trough. They contacted
the water in attitudes and speeds simulating Orbiter ditching
conditions. No-one had ever ditched an airplane at the typical
landing speeds of the Shuttle and the results were disappointing.

When the model contacted the water in the fkat attitude that was
achieved with a normal landing speed of 200 knots, it would skip badly
and become airborne again. The second or third contact was usually
very violent, resulting in forces that woud totally destroy and
Orbiter.
When the model simulated the slower landing speeds made possible
by the delta-wing configuration, the nose-up attitude would cause the
body-flap to contact the water first, and the cockpit would pitch
down violently, slamming into the water.
One interesting test showed that if the orbiter approached with
the landing gear down, it would immediately turn into a 'submarine'
and dive straight to the bottom!
[Bob Overmyer, Space Flight News, May 1987]

(66) On STS-5, there were 5 astronauts on board, but the two ejection seats
remained in place but were unarmed. It had been originally proposed
that the escape sequence would continue as follows:-
The astronaut seated in the centre seat on the flight-deck would
leave his seat and descend to the mid-deck if an emergency arose. The
three in the mid-deck would then don-parachutes, wait for the Commander
and Pilot to eject, and then climb through the two holes in the roof.
This was rejected quickly, as it was found that the control
wires would be severed in the roof after the ejection, and the orbiter
would definitely go out of control. Besides this, those that crawled
out would be brought around and slammed into the OMS pods on the
rear of the orbiter!
[Bob Overmyer, Space Flight News, May 1987]

(67) Using a small setup of around 25-pounds worth of Radio equipment,
a teacher and a group of students at Kettering Grammar School,
England, were regularly keeping track of the Soviet 'eight day
wonders' - recoverable satellites in the cosmos series. In 1966,
differences in some of the orbits led to the discovery of a new
Soviet launch site that had previously been a closely guarded secret
of the USSR and the Pentagon. This site was christened in the west
as 'Plesetsk'. Nearly 20 years passed before the Soviet Union
publicly announced the existance of the site, and the Kettering
group were proud to hear that they maintained the same name.
[Space Flight News, May 1987]

(68) The kettering group, a small team of students and their teacher at
Kettering Grammar School, England, were keeping track of the Soviet
Soyuz-11 manned spaceflight. They received the signals of the
depressurization of the Soyuz module, and were keeping track of
the cosmonaut's heartbeats up until they lost contact. The capsule
would have landed within 30 minutes of this loss of signal, but
unfortunately all three cosmonauts were found dead. If they had
been wearing their space-suits at the time, they might have
survived.
[Space Flight News, May 1987]

(69) In the weightlessness of space, the antennae of the big Hughes Intelsat 6 spacecraft would be able to unfurl on their own, but during Earthly tests the two larger antennae needed some help to defy gravity. Engineers at Hughes Aircraft Company in El Segundo, California, turned to Helium-filled ballons to perform the task!
[Space Flight News, June 1987]

(70) The current soviet spacesuit, used on-baord the MIR space station, requires the cosmonaut to swing the back-pak around and step into it from the back!
[Space Flight News, July 1987]

(71) Belive it or not, the final analysis showed that, although 'Columbia' basically had about 30,000 separate tiles on it's exterior, they installed - in the period from May '79 until it finally flew in April '81 - a grand total of over 90,000 tiles!
[Bob Overmyer, Space Flight News, July 1987]

(72) On STS-5, even though the commander and pilot ejector seats were disarmed, those two astronauts had to wear the SR-71 harness-type waistcoat in order to remain compatible with the seat!
[Bob Overmyer, Space Flight News, July 1987]

(73) STS-5 was also the first time astronauts wore the now=familiar pale-blue suits used before the Challenger accident. (This was used in place of the SR-71 type flight-suits used on the first 4 flights.)
[Bob Overmyer, Space Flight News, June 1987]

(74) The shears used by astronaut Joe Kerwin to sever the strap of debris retaining the jammed solar wing on the Skylab Space station, were of a type more usually employed for snipping barbed wire. Manufactured in Missouri, they were purchased by NASA for the pricely sum of $75!
[Space Flight News, August 1987]

(75) Whilst the Shuttle was still in development, Fred Haise amd Jack Lousma were scheduled to pilot STS-3 which was to have boosted Skylab back into orbit. Alas, Skylab to down in Western Australia in 1979, 2 years before the 1st flight of Columbia.
[Bob Overmyer, Space Flight News, October 1987]

(76) The Soviets have a long-standing custom of only calling their people 'Cosmonauts' after they have travelled in space. This conflicts with the US version, where astronauts are so named as soon as they have been accepted into NASA employment after passing the selection tests.
[Space Flight News, August 1987]

(77) Pete Conrad became the first tattooed man in space on the Gemini 5 mission. He had a blue anchor and stars tattooed on his right arm.
[Space Flight News, October 1987]

(78) To train Shuttle pilots prior to making their flight, in the area of landing, NASA uses a modified Gulfstream 2 executive jet. The cockpit has been divided into two - with Shuttle controls on the left, and

all the Gulfstream controls on the right.
[Space Flight news, December 1987]

(79) The flight dynamics of the Shuttle were calculated before the Shuttle actually flew, and the GUlstream 2 trainer was modified accordingly. The calculations were quite accurate, and very few changes have been made since the Shuttle has entered service.
[Space Flight news, December 1987]

(80) The following is a long list of trivia tid-bits which comes from the December 1987 issue of Space Flight News. It was published as a quizz, and the answers were found in the same issue. Only those questions worthy of being items of trivia are included.
(a) This is a list of 'should not have but did' of what some astronauts/ cosmonauts took into space.
(i) The crew of Vostok 2 used a box of matches they carried in their flight to light a fire after they had overshot the landing zone.
(ii) Tom Stafford took a small set of handbells along for the Gemini 8 mission, which took place just before Christmas.
(iii) The crew of Apollo 15 broke NASA regulations, and were later severely reprimanded, for carrying a batch of first-day covers to the surface of the moon in their personal lockers.
(iv) Gus Grissom ate a corned beef sandwich on the Gemini 3 mission. It was given to him by his crewmate, John Young, who had sneaked it on board. Grissom later vomited, ruining a dietary experiment NASA had set for him.
(b) Bits 'in Pieces.
(i) A helmet visor was cracked on the Gemini 3 mission, when Gus Grissom's helmet struck the instrument panel as he was thrown forward during the automatic parachute descent sequence prior to splash-down in the Atlantic Ocean.
(ii) A camera was left in Earth Orbit during the Gemini 10 mission.
(iii) A feather was dropped on the Apollo 15 mission. This was done alongside a hammer to prove that one of Galileo's most significant laws was indeed correct. The feather and hammer hit the surface of the Moon at the same time.
(iv) Apollo 16 astronaut John Young tripped over one of the leads attached to ALSEP, rendering it useless and falling to the surface.
(v) Valentina Tereshkova bruised her nose on the landing of Vostok 6 in June 1963.
(c) Planetary Bits
(i) Luna 3, the Soviet Probe, returned the first pictures of the Moon's previously unseen farside in October 1959.
(ii) Luna 10 became the first spacecraft to enter orbit around the Moon in April 1966.
(ii) Venera 4 became the first successful soviet mission to Venus by delivering a small capsule in October 1967.
(iv) Venera 9 returned the first pictures of Venus' surface in October 1975.

(v)Mariner 10, from the US, is the only spacecraft ti have
reached Mercury. It made 3 flybys of the planet.
(vi) Pioneer 10 was the first operating spacecraft to cross the
asteroid belt en route to Jupiter.

(81) On the first separation test of Enterprise and the Boeing 747 in the
Approach and Landing Test program of 1977, the Shuttle separated
from the 747 that the first photograph - initially intended to
be taken when the orbiter was a few feet away from the orbiter - was
taken when the orbiter was over 70 feet away from it's carrier.
[Bob Overmyer, Space Flight News, March 1988]

(82) The original circular hatch to bu used ofr entering and exiting the
Lunar Module on the suracfe of the Moon was squared-off when
astronaut Roger Chaffee observed that it was difficult to clamber
through a round hatch with a square backpack on - particularly
going backwards.
[David Shayler, Space Flight News, April 1988]

(83) Descent and Ascent stages of the Lunar Module were passed through a
bizarre procedure to ensure that loose parts or tools weren't left
lying around inside it. This involved mounting the device on a large
support structure and rotating it slowly to free loose items and
let them drop to the floor.
[David Shayler, Space Flight News, April 1988]

(84) Once locked into their landing position, the legs on the descent
stage of the Lunar Module could not be retracted again.
[David Shayler, Space Flight News, April 1988]

(85) The landing probes on the feet of the Lunar Module were fitted to all
but the forward gear. The probe was removed from this leg after
astronauts McDivitt and Schweickart tested the Lunar Module
LM/3 Spider in Earth orbit for the first time in March 1969. It was
thought that the probe might curl up and prove to be a hazard to
the astronauts as they stepped on and off the final rung of the
ladder that led them to the surface from the exit hatch of the Module.
[David Shayler, Space Flight News, April 1988]

(86) The ladder mentioned above was made of a material that was so light-
weight that it could only support the weight of a man in the 1/6th
gravity of the Moon. On Earth the ladder would break.
[David Shayler, Space Flight News, April 1988]

(87) Because the Lunar Module did not have an air-lock, the Module had to be
depressurized and repressurized before and after every excursion. For
this reason and as a general safety precaution, the hatch was left
slightly ajar as the astronauts were roaming around the surface.
Imagine being locked out of your vehicle so far away from home!
[David Shayler, Space Flight News, April 1988]

(88) On Feb. 21, 1969 in the final hours of the countdown of the first
launch of the massive N1 booster, Cheif Designer Mishin went to the

launch pad while propellants were still being loaded, and cristened
the rocket traditionally be breaking a bottle of champaign against
the cold hull of the rocket.
[IZOBRETATEL I RATSIONALIZATOR, No. 8, Aug, 1990, pp 20-21, "The
History of Technology: How We Conceeded the Moon: A Look by One of
the Participants of the N-1 Drama at the Reasons Behind it", by Vad.
Pikul. FBIS-USP-91-002. Submitted by dennisn@ecs.comm.mot.com]

(89) Lazarev and Makarov, the crew of Soyuz 18-1, who were forced to abort
the launch after half the explosive bolts holding the first and second
stages of the booster together failed to blow. After a 14g reentry
from 90 miles up their capsule hit a mountain near the Chinese border
and rolled down, leaving another crew to spend a day huddled round a
fire waiting for rescue.
[Source: Janes Manned Spaceflight Log,
from Mark Grant <mark@isltd.insignia.com>]

(90) Although during the day it is only possible to watch a shuttle launch
with the naked eye until just past SRB seperation, a night launch
with clear skies can be followed until the main engines cut out.
[Source: STS-35, which we could see until it disappeared behind a
cloud when 1200 miles downrange. Mark Grant <mark@isltd.insignia.com>]

(91) The early days of space flight at Missile Firing Laboratory were a
mixture of experienced engineers and scientists with seemingly crude
and brute force methods to launch missiles.
"With the launch of Redstone #1 in August 1953, the Missile
Firing Laboratory inaugurated the testing of balistic missiles. In
those days, launch procedures were unsophisticated. Albert Zeiler,
one of the Peenemunde veterans, had to decide within a split second
whether to shut off the engine immediately after ignition, basing his
decision upon the color of the flames. An off-color indicated an
improper mix of the propellants. A couple of minor delays had
occurred earlier, but on the morning of 20 August 1953 the flame
color met Zeiler's approval, and the Redstone rose."
["Moonport, A History of Apollo Launch Facilities and Operations",
Charles D. Benson, NASA History Series, NASA SP-4204, pages 7-8, 1978.
Submitted by gregb@tunfaire.den.mmc.com]

(92) The Russian Foton class Cosmos vehicle, used today for remote-sensing
and Earth photography applications, is the same Vostok capsule
that launched Yuri Gagarin into space back in 1961!
[Space Flight News, June 1988]

(93) Pad 39B, one of the two Shuttle Launch complexes, has been used very
few times. In fact, the only times it has been used previous to
Shuttle flights are:-
(1) Apollo 10 in May 1969,
(2) Skylab 2 in May 1973
(3) Skylab 3 in July 1973,
(4) Skylab 4 in November 1973
(5) The Apollo/Soyuz flight in July 1975.

[Space Flight News, August 1988]

(94) Pad 39B was first used on a Shuttle Launch in 1986 by the ill-fated 51-L Challenger flight. This contributed nothing, by the way, to the accident itself.
[Space Flight News, August 1988]

(95) Astronaut Charlie Bolden, veteran of the 61-C/Atlantis missions in January 1986, became the first man to ride the slide-wire escape system on Pad 39B on July 8, 1988, reaching a maximum speed of roughly 55mph.
[Space Flight News, September 1988]

(96) Chinese SKW recoverable satellites have an interesting feature in their structure. To withstand the heat of re-entry, the shuttle uses special tiles, and soyuz uses a special ablative material that melts away as it gets hot. The Chinese, on the other hand, use Wood.
[Space Flight News, October 1988]
(We've heard that this wood is OAK. Does anyone have any information on this?)

(97) The only two countries which refused to telecast Neil Armstrong's moonwalk were the USSR and China.
[Space Flight News, March 1989]

(98) LENGTH WARNING - This one's quite large.....
One evening, during the launch pad checkout of the stacked Apollo spacecraft and Saturn 5 launch vehicle for Apollo 17, one of the support crew astronauts had to enter the Lunar Module to conduct some checking and testing. The Lunar Module was nestled under the protective shield of the Apollo Command & Service Module and the streamlined launch vehicle nose-fairings.
Normally, all workers on the Saturn stack had to empty their pockets at the control points before getting close to the vehicle. Astronauts had permission to wear their standard flying suits in the Lunar Module and Command Module, as long as they kept their pockets zippered closed.
On this particular day, however, the astronaut in question had some coins in his breast pocket, which had been left unzipped by mistake. As he traversed the catwalk to the Lunar Module, he leaned over and coins spilled out. They could be heard bouncing off the structure as they fell through the Instrument Unit ring and lodged somewhere against the top of the S4B third stage that would propel them from low-Earth orbit to the Moon.
I calculate that the coins stayed there until after the Trans Lunar Injection 'burn', when the S4B put them on the same trajectory to the Moon as the CSM/Lunar Module combination.
Some day in the distant future, people are going to walk on the Moon again, and they may just find a few US coins lying in the dust!
[Bob Overmyer, Space Flight News, June 1989]

(99) With a total Height of over 75 feet, the 747/Orbiter combination has
been described by some journalists as 'The World's Largest Biplane!'
[Space Flight News, June 1989]

(100) The Shuttle Carrier Aircraft must never be flown with the Shuttle
aboard if the ambient temperature is less then 15 degrees Farenheit.
This is because, on the type of long-duration flights the SCA
typically makes when ferrying the orbiter, there is a risk of fluids
within the Orbiter freezing and causing some serious problems.
[Space Flight News, June 1989]

(101) The shuttle has two possible positions or 'attitudes' available when
onboard the SCA 747. The initial attitude was a 'nose up' attitude,
and this was used primarily for the Approach and Landing Tests of the
late 1970's. Presently, the Shuttle spends most of it's time in the
second available position, where it is more or less parallel to
the SCA's upper fuselage.
[Space Flight News, June 1989]

(102) The Shuttle's tyres are designed to withstand temperature extremes
of minus 65-degrees Farenheit to plus 200-degrees Farenheit, and
are inflated, with the craft standing static on the runway, to a
pressure of 327psi, with an over-inflation margin of 40psi.

(103) Apollo 1 was scheduled to actually fly in late 1966. As development
of the black-1 spacecraft progressed, it became apparent that the
Command Module earmarked for the Apollo 1 missions would not be ready
in time for a tentatively-scheduled joint flight involving the
tenth and final manned Gemini mission, Gemini 12, in late 1966.
The tragic Apollo 1 fire occurred in February, 1967.
[Space Flight News, November 1989]

(104) It is unfortunate that NASA did not learn earlier about the fire
hazard problems associated with a pure-oxygen atmosphere in the
Block 1 Apollo Comand Module design. Flash fires had previously
broken out in two boilerplate cabin mock-ups in September and
November of 1963.
[Space Flight News, November 1989]

(105) Post-accident investigations revealed that Ed-White spent his dying
moments trying to open the hatch of the Apollo 1 spacecraft. The
hatch was criticised as one of the major factors contributing to the
death of the three astronauts in 1967. It is not widely appreciated
that a revised hatch design was already under develpment at the time
of the Apollo 1 tragedy.
[Space Flight News, December 1989]

(106) When Gus Grissom and John Young came to name their Gemini 3
spacecraft, they chose the title 'Molly Brown' after a character
in a play that was running on Broadway at that time: The Unsinkable
Molly Brown. NASA officialdom baulked at such an apparently flippant
title and refused the astronauts permission to adopt it. Nevertheless
Grissom and Young devised an appropriate patch to wear on their

spacesuits: it depicted their Gemini capsule floating in the Ocean,
with the name Molly Brown emblazoned above it.
All of this should have been maintained in 'low profile' mode,
with the official callsign being "Gemini 3". However, the CAPCOM
(Capsule Communicator) at launch, astronaut Gordon Coo[er, blew
Grissom and Young's cover by exclaiming, as the rocket cleared the
tower 'You're on your way, Molly Brown!'.
[Chris Faulkner, Space Flight News, January 1990]

(107) On average, the Apollo astronauts spent a total of about 22,000
hours in simulator sessions, 5,000 hours in briefings, and 3,000
hours conducting hardware tests.
If one includes in this figure time engaged in related
training, the eleven Apollo-series missions absorbed a staggering
84,000 hours of astronaut training and briefing time.
[Space Flight News, January 1990]

(108) On Apollo 11, the crew were worried that Neil Armstrong's leg might
snag the abort handle, ending the mission in the Atlantic ocean just
minutes after it had started!
[Space Flight News, January 1990]

(109) Dick Gordon, on Apollo 12, was so convinced that lightning storms
would delay the launch 24 hours, that he managed to drift off to
sleep during the countdown.
[Space Flight News, January 1990]

(110) At the end of Apollo 12, the hardest ocean landing was recorded - 15G!
This jarred a 16mm camera from it's mounting, hitting Al Bean's head.
[Space Flight News, January 1990]

(111) Many of the tests that the Mercury astronaut candidates took are now
considered to have been unnecessary. Things like 'Write twenty
sentences beginning with the words 'I am...', or stare at a blank
piece of paper and describe what you see. Scott Carpenter, it is
reputed - when stuck for his twentieth sentence, wrote in anticipation
'I am an astronaut.' stating afterwards that this simple statement
tipped the balance towards his selection.
[Space Flight News, January 1990]

(112) The Mercury capsule had in effect some seven miles of wire used for
it's control system, but had a total internal volume roughly equal to
that of a telephone booth.
[Space Flight News, January 1990]

(113) The Pad Rescue Team came closest to performing an emergency rescue
during a launch attempt for the maiden votage of Discovery - mission
41-D - on June 26, 1984. At T-4 seconds, the SSME main engines were
abruptly shut down. With hydrogen running free in the vicinty of the
now hot engines, everyone held their breath. Then a fire was detected
along the trailing edges of the orbiter's elevons, and the orbiter
itself began to burn.

The crew sat tight as the water-deluge systems were activated.
A few tense moments rolled by with the Rescue Team sitting suited
and waiting for a 'Go' from mission control. The fire went out, the
vehicle made safe and the crew extracted after just 35 minutes.
[Space Flight News, June 1990]

(114) Of the Apollo astronauts, nearly all of them are alive. Sadly, Jack
Swigert was the first Lunar-Orbiting astronaut, and Deke Slayton
the first Moon Walking astronauts to die.

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* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
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(1) Grissom had a reputation for speaking Army Creole. Lines like
"F***ing A, Well Told, Bubba". It was a factor in the vote for
Sheperd being the first man up. The other astronauts were kind of
concerned about Grissoms First words.

(2) Weightless intercourse - "Sex in Space" - is said to have been
accomplished in both the US and Soviet/Russian Space programs. This
has been said to have happened not once but as much as 7 times!
[The Three Dolphin Club, G Harry Stine, Analog Science Fiction/
Science Fact.]

(3) In terms of complexity, it is interesting to gain a comparison of the
Shuttle and Apollo systems. It has been estimated that the whole
Service Module is only equivalent of each one of the Orbital
Maneouvering Systems on the rear of each orbiter.

(4) In 1969, when Donald Buchanan - KSC's chief of engineering - travelled
to London to accept the Diamond Jubilee trophy of the Royal
Automobile Club for "The Outstanding Contribution on the field of
Automotive Transport", he carried with him a small scale model of
the crawler vehicle (He was accepting the award because of the Crawler
Trans-porter). On seeing the model in Buchanan's suitcase, the
customs officier on duty at the airport - obviously unaware of the
real-life crawler - earnestly enquired if he was a travelling
salesman selling farm machinery!

(5) Other than the launch escape tower, the entire Mercury-Atlas vehicle
that put John Glenn into orbit will fit inside the payload bay of the
shuttle (or at least it works with 1/144 scale plastic kits 8-)). I
don't have any mass information handy on the Atlas, so I'm not sure
whether a fully fuelled Mercury-Atlas would be under the shuttles
payload mass limits though.

[Mark Grant <mark@isltd.insignia.com>]

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* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
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(1) The tip of the escape tower on the Saturn V/Apollo was topped by an item
called a Q-Ball made by a company called Nortronics. That's all I know
for certain. I surmise it may have been an optical retroreflector to
get an accurate position measurement at initial lift-off, but it could
have been something more exotic. Any answers would be appreciated.
[From rriemer@nas.edu]

(2) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(3) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists son's was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(4) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(5) John Young is the only astronaut to have flown 6 missions. To date,
no other astronaut has even flown 5.
(One of our local NSS chapter members pointed this out, and I was
wondering if it was true. Can anyone help here?)

(6) NASA was planning at some stage to fly Columbia unmanned so that they
could remove the back-log of payloads waiting to reach orbit.

NASA had 13 old-specification SRB's in storgae at the time.
[Space Flight News, September 1988, but I find this one hard to
believe. That's why it is down here.]

The next four were from a TRUE or FALSE quizz in Space Flight News April
1989 issue. The answers weren't published (as far as I can find) so
I am including the items here so that someone else can tell us which
are true and which are false.

(7) There was a much cheaper way of launching satellites, according to
McGill University experimenters in 1963. Developing an idea first
proposed by Jules Verne, the McGill team used a rebored 50-foot-long
cannon from the battleship USS Washington to loft missiles to an
altitude of 65 miles.
By employing this technique to launch a Martlet rocket, the
McGill experimenters reckoned they could put a 50-pound payload
into orbit for less than the dollar equivalent of 18,000 pounds.

(8) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(9) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(10) Under the direction of NASA's Ameas Research Centre in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

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* Trivia List Submission Policies and Guidelines *

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The policies dictating what should be included in this file are
subject to change at any notice, but will hopefully remain solid around the
following short guidelines:-

(1) Comparisons of Space Hardware to common concepts or everyday
objects. (eg the list of interesting facts on the strength
and capabilities of the Space Shuttle Main Engines)
(2) Similar to No.1, comparisons of modern hardware to older hardware
(eg how a Mercury capsule could fit inside the engine shroud
of the F-1 engines on the Saturn V)
(3) Plans of what different space agencies were once planning but
have since cancelled.
(4) Stories of lost opportunities from funding cuts.
(5) Personal accounts of what 'Human Space Travellers' (Cosmonauts,
Astronauts, Euronauts etc) have said or done that are
suprising, astounding or otherwise interesting in some way.
(6) Miscellaneous pieces of trivia with a sufficiently high interest
quotient. (ie, something likely to lift the eyebrows of
perhaps just a few people and warrant a real 'Oh WOW, I
didn't know that!'.
(7) Rumours of a justifiable nature. This will need a separate
section to be included in the list (To be set aside from
trivia FACTS).

Policy on excessive rumours and untruths:-

As it is planned for this list to be updated regularly, additions to
this file will hopefully come at a regular rate. Posting to newsgroups
sci.space, sci.space.shuttle, sci.astro and perhaps the new space group of
the ham.radio collection of groups will hopefully arouse enough regular
interest to keep this list growing.
Additions will then undergo minor scrutiny before inclusion in the
list. If the moderator or any other person on the net have any reason to
believe that a certain item of trivia may be false, then the item will be
included in an 'Un-justified' group in this list. The owner of the
information may then be asked to include some sort of evidence of information
- whether it be references to works of other people, or working-out from
scratch - then this will be investigated to determine whether the item has
been doctored in any way.
We hope to have our facts as found on record in at least one place
around the globe, and our rumours as heard by at least a number of people.

****
* Submissions: *
****

For these reasons, we have a rough guideline for the format of
submissions to this list, namely:-

(1) In the subject header for the message, please include somewhere 'Submission for Trivia List'. You may include a brief title or whatever if you can squash it in. No need for a summary unless you are just accustomed to doing them.
(2) FACTS: Please include some source information for your information. This sort of thing usually depends on the circumstance. Cost comparisons etc would prefer sources for values, Size comparisons would prefer measurements and where they were quoted from etc. If the trivia isn't yours, then let us know from where it came.
(3) RUMOURS: It is hard to justify this one, but let us know if it is complete hear-say or if it is based on some report issued by whatever agency on the efficiency of whatever you think appropriate. Just give us some background - if you could.

It's not like we'll be critical or anything - beggars can't be choosers - but it would help in the final organisation of everything if these simple guides were included.
We'd like to include that, if the work gets hard, we'll issue a semi-formal-submission-format so that we can semi-automate the process.

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* UPDATE LOG: *
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28/6/93 - Started the list for the first time, created the initial policy guidelines and posted the request for more trivia information to newsgroups sci.space, sci.space.shuttle, sci.astro and rec.radio.amateur.space. (It may prove necessary to remove this last group from the list if any of their group mentions that it is an inappropriate item for their group. The initial posting is to perhaps include some interesting trivia from their own personal experience, so for the moment it is to be included.)
Only items so far included are those from the Trivia Section of the 'Newcastle Space Fronter Society Update' - a privately distributed newsletter of the Newcastle chapter of the National Space Society of Australia, the Australian Network of Chapters of the National Space Society. (That's a lot to get down into one paragraph!)

17/7/93 - Changed the layout of the List by basically inverting the submission information - from top to bottom to make it better to read. Also, have received suggestions of posting only an updated list, but rather I think I'll include a list of changes in the first few lines, and people can still read through the rest if they've never seen it before.
Included new ones from Shuttle by Nigel MacKnight, and also from the BIS Spaceflight Magazine.

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST

lukpla@scorch.apana.org.au
=-

58. Shuttle broadcasts via shortwave?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-25 01:14:40 UTC
From: truemner@ice6.kcps.rd.hydro.on.ca
Message-ID: <truemner-240793205452@wren.rd.hydro.on.ca>
Source record: 28717

Please help with INFO RE: a mailing list? or other source for broadcast
times for shuttle missions, latest on shuttle mission activities.
...I am trying to justify a Drake D8...please help my negotiation effort!!

EXAMPLE:
In article <221oq8$d5n@bronze.lcs.mit.edu> moisan@bronze.lcs.mit.edu (David
Moisan) writes:
>Yes, you can hear rebroadcasts of space shuttle audio. WA3NAN in Greenbelt,
>MD, transmits them on 3860, 7185, 14295 and 21395 kHz among others.
>Good luck--the reception was awful during the last mission...

I have found it much easier to get the shuttle by listening to one or two
frequencies in the amateur 2-M FM band. Just about any radio capable
of 2-M FM will do. Works great with a little whip too...
^^

bye for now....Gary.
_______....this message represents my opinion, NOT OH Technologies'.
*GTsource? power station inspection,R&D/Video&Ultrasonics since 1978
^^

- Thanks,"ai" _| _| _| _| _|_|_| _|_|_| _|_|_| *a CBC/RCI +
- _| _| _|_| _| _| _| _| _| _| radio fan +
- _|_|_| _| _| _| _|_|_| _| _| +
- ONTARIO's _| _| _| _|_|_| _| _| _|_|_| -electric +
-+-+-+-+-+-+internet> truemner@ice6.kcps.rd.hydro.on.ca -+-+-+-+-+-+

59. Re: Staellite Data Formats

Newsgroup: rec.radio.amateur.space
Date: 1993-07-25 23:29:07 UTC
From: jtm@beta.hut.fi
Message-ID: <22v503$dtd@nntp.hut.fi>
Source record: 28718

In article <22g2tq$2thg@ilx018.intel.com> dbraun@iil.intel.com writes:
>
>Could someone tell me some info about the digital formats
>that the various satellites use?

While my KO-23 download occurs in the other window, let's have a
short list of them. Of the packet satellites having a mailbox onboard,
and being currently active, the UO-22 and KO-23 both use the 9600 bps
FM FSK uplink and downlink. AO-16, LO-19 and FO-20 use 1200 bps FM FSK
uplink and 1200 bps BPSK (USB) downlink, all AX-25.
The FO-20 mailbox works like an ordinary BBS, but the Microsat series,
at least UO-22 and KO-23 use a more efficient way for user interaction.
The pg and pb software are for upload and download utilizing a broadcast
protocol so that you can benefit from others downloading software.
Additionally, the download fills holes in your files so you can
download a file in multiple sessions.

>What other types of madulation are used? How does one obtain the
>necessary modems? I haven't seen anything mentioned in the

I built a cheaper than DSP configuration with 2 TNC2S controllers
adding a 9600 FM/FSK and a 1200 JAS-1 both G3RUH type modems. The
connecting, both TNC-modem and modem-radio (Kenwood TS-790) both
required some soldering. The default 1200AFSK modem bypass was not
a plug and play thing as expected keeping things in the budget :-)
The 9600 needed the AF filtering bypassed in the rig taking audio
output directly from the IF unit.
Hope this simplistic note gives you some ideas how to proceed.
73 and hpe cu in the packet satellite!
--
Jari Malinen jtm@vipu.hut.fi | OH2BBU@krk.fi | OH2BBU@OH2RBG.FIN.EU
Phone +358-0-597251 Fax +358-0-5091180 - Helsinki U of Technology, Finland -

60. ANS-205 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 02:14:59 UTC
From: cowdin@pogo.DEn.mmc.COM
Message-ID: <$ans-205.01@ampr.org>
Source record: 28722
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-205.01
DOVE RECOVERY EFFORTS STARTED

HR AMSAT NEWS SERVICE BULLETIN 205.01 FROM AMSAT HQ
SILVER SPRING, MD JULY 24, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-205.01

DOVE-OSCAR-17 (DO-17) Recovery Efforts Started This Week!

DOVE ground station control operator Jim White (WD0E) accomplished a major first step in the recovery of DOVE-OSCAR-17 (DO-17). With the assistance of Bill McCaa (K0RZ) thirty miles away, WD0E was able to send commands and listen to the results using an phone-patch between him and K0RZ. K0RZ's station, using a 4 ft diameter Mode-S dish and a NIR-10 DSP unit, was the S-Band "ears" for WD0E. Using K0RZ's excellent S-Band set up, WD0E was able to send commands and listen to DOVE's reponses quite clearly. The first command that WD0E sent was what he refers to as the "fire-code." This immediately reset DOVE's on-board computer to its most basic operating system software known as MBL. MBL is stored in DOVE's computer in Read Only Memory (ROM) chips. After having verified that the computer had re-set, WD0E then sent several commands to turn-on and then off the S-Band transmitter to be sure that the Telemetry and Command (T&C) system was functioning. After having confidence that DOVE was hearing the commands and reponding correctly, WD0E then commanded DOVE to send 30 frames of telemetry on its 2M downlink frequency of 145.825 MHz. While the 30 frames of telemetry was being sent, K0RZ was simultaneously recording and decoding it. WD0E points out that the major significance of this first step was that it assured him that DOVE's primary systems were still in good shape and that the receivers and transmitters were working normally along with the T&C system. From this point onward, Harold Price (NK6K) will proceed to reload the "house-keeping" software. If necessary, K0RZ has volunteered his station to assist in the DOVE "house-keeping" software reload operation. With this sucessful first step, WD0E is very optimistic that DOVE can not only be restored to full operation, but it can be made to "speak" and perform its primary mission of education. Please stay tuned to the AMSAT News Service (ANS) bulletins for further updates on the status of the DOVE recovery effort.

[The AMSAT News Service (ANS) would like to thank Jim White (WD0E) for providing the details of this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-205.02
CALL FOR PAPERS

HR AMSAT NEWS SERVICE BULLETIN 205.02 FROM AMSAT HQ
SILVER SPRING, MD JULY 24, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-205.02

Call For Papers For the AMSAT-NA Space Symposium OCT 8-10

The 1993 AMSAT Annual Meeting and Space Symposium provides a unique opportunity for you to share the valuable experiences you've had over the past year with the rest of the amateur satellite community. The AMSAT enthusiasts of North Texas are working hard to make the 1993 meeting a "smashing success." But it can only be successful with your help. This is a call for papers to be presented and published in association with the Symposium this year.

If you would like to submit a paper, simply compose a short abstract describing the purpose and scope of the paper. Abstracts are due by July 30, 1993. The final draft of the papers are then due by August 27, 1993. Please mail all submissions to the address below.
Presentations and technical papers are the meat of the AMSAT Annual Meeting and Space Symposium. Even if you will not be able to attend, please consider writing a paper for publication in the proceedings. Help us make this year's Symposium one to remember.

Doug Howard - KG5OA
2517 Coldstream Drive
Fort Worth, TX 76123
CServe Address 70233,3517
++

IF YOU RESPOND BEFORE 26 JULY, YOU MAY DIRECT THE ABSTRACT TO:

Keith Pugh - W5IU
P. O. Box 121576
Fort Worth, TX 76121
CServe Address: 76177,3306
INTERNET: w5iu@amsat.org

/EX
SB SAT @ AMSAT $ANS-205.03
EME CONTACT FOR OSCAR USERS

HR AMSAT NEWS SERVICE BULLETIN 205.03 FROM AMSAT HQ
SILVER SPRING, MD JULY 24, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-205.03

VE3ONT Provides EME Contacts For OSCAR Satellite Users

The Toronto VHF Society, using the callsign VE3ONT, will use the 46M (150 ft) diameter radio telescope at Algonquin Provincial Park (grid FN05xw) during this year's ARRL International EME Competition.

VE3ONT will be active the full weekend of each contest period, October 9-10 and November 6-7. Below is the schedule of operations:

Date VE3ONT TX Freq. Listening range Approx. times (UTC)

Oct 9 432.050 432.050 - 432.060 0445-1830
Oct 10 144.029 144.025 - 144.030 0550-1900
Nov 6 432.050 432.050 - 432.060 0340 1700
Nov 7 1296.050 1296.050 - 1296.060 0450-1730

VE3ONT will operate "split" and we ask that stations avoid calling us on our transmit frequency. VE3ONT will transmit and receive with left-hand circular-polarization (LHCP) off the dish on all bands. This means that after reflection from the Moon, signals will be right-hand circular polarized (RHCP). This will permit us to work stations with vertical, horizontal, or RHCP polarization. VE3ONT will transmit at the legal power limit on 144 and 432 MHz and 100 watts on 1296. Power amplifiers and receiving preamps are located at the dish feed.

As users of a non-amateur antenna, we will not be in competition with other stations. Our intention is to provide an initial EME contact for as many stations as possible. Consequently, we strongly discourage duplicate or "insurance" contacts. Operation will be primarily on CW, although SSB might be employed depending on signal strength and number of stations calling.

All operation will be "random" format, meaning that VE3ONT will accept no skeds. If conditions are poor, we will use a 30-second sequence in which VE3ONT transmits the first 30 seconds and listens during the second 30 seconds of each minute. Note that this is NOT the usual sequence for EME skeds.

VE3ONT will maintain HF liaison on 14.345 MHz during daylight hours and on 3.818 MHz at night.

We anticipate being able to work OSCAR-class stations with 100 watts of output power on 144 and 432 MHz; 25 watts should be sufficient on 1296 MHz. Photographs and technical information concerning the dish and VE3ONT's operation will be presented by W9IP and VE3ASO at the Central States VHF Conference and the Eastern VHF/UHF Conference.

For clarification, contact Dennis Mungham (VE3ASO) (613) 998-7330/989-2339 or Michael Owen W9IP (315) 379-0161/379-5975. QSL to VE3ONT (Callbook address).

/EX
SB SAT @ AMSAT $ANS-205.04
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 205.04 FROM AMSAT HQ
SILVER SPRING, MD JULY 24, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-205.04

AMSAT Operations Net Schedule

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the

start of the Ops Net, the frequency of 145.950 MHz is being used for a QSO, Ops Net enthusiasts are asked to move to a frequency of 145.955 MHz

Date UTC Mode Phs NCS Alt NCS

24-Jul-93 1930 B 70 N7NQM W5IU
31-Jul-93 1300 B 98 WB6LLO WA5ZIB
07-Aug-93 1530 B 72 WA5ZIB WJ9F
14-Aug-93 2000 B 90 W9ODI N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-205.05
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 205.05 FROM AMSAT HQ
SILVER SPRING, MD JULY 24, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-205.05

Weekly OSCAR Status Reports: 24-JUL-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Jul 24-Aug 09
Mode-B : MA 0 to MA 30 !
Mode-S : MA 30 to MA 55 !<- S transponder; B trsp. is OFF
Mode-S : MA 55 to MA 60 !<- S beacon only
Mode-BS : MA 60 to MA 105 ! Blon/Blat 150/0
Mode-B : MA 105 to MA 256 !
Omnis : MA 170 to MA 15 ! Move to attitude 180/0 09-Aug-1993
Please do not uplink to Mode-B between MA 25 through 40 as this will QRM the Mode-S users. Don't rely on gossip and rumor! Continuous up-to-date information about AO-13 operations is always available on the beacons on 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

MIR: RD3VR, QSL Manager for the MIR space station, reports that he often receives many letters with QSL cards for MIR contacts. He wants to assure everyone who is kind enough to include write a letter that they are read.

RD3VR asks that all who send QSL cards to please enclose your QSLs in a sealed envelope. Also, please send him QSL cards for contacts made only made after 01-JAN-93. And one final request from the QSL Manager of MIR, he asks that you also include a self-addressed-stamped-envelope (SASE) with your QSL card. If you have additional questions about QSL cards and the MIR space staion, you can direct your questions to him at the following packet radio addresses: RV3DR@R2MIR-1 or RV3DR@RK3KP.MSK.RUS.EU. Please send your QSL cards to either of the following addresses:

RV3DR-Serge Samburov, Space QSL Manager
P.O. BOX 141070, BOX 73, Kaliningrad-10 city, Moscow Area,
RUSSIA.

or direct:

P.O.141070,Kaliningrad city, Moscow Area,
prospekt Cosmonavtov, dom 36, kw 96, RUSSIA

The South American QSL Manager for MIR is LW2DTZ. His address is:

Gustavo Carpignano
M.Rosas 2044
1828 - Banfield
Buenos Aires - Argentina

For Australia, use VK3CFI's Call Book address.

[Chief of Cosmonaut Amateur Radio Department NPO "Energia" RV3DR]

FO-20: N0NBH reports that FO-20 is performing superbly in both its Mode-JA (analog) mode and its Mode-JD (digital) mode this week with out any problems. [N0NBH]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

61. APT-Satellites: Report JULY 24, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 09:27:25 UTC
From: peter.henne@gmd.de
Message-ID: <1993Jul26.092725.11089@gmd.de>
Source record: 28719
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, JULY 24, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 On

Normal operations except for METEOR 3-4, which now orbits
around the terminator (more or less). This causes the spacecraft
to switch APT to the ir-channel even at mid-latitudes. Only
the burst is transmitted, the ir-image is empty.
No other APT-Signals monitoring 137.00-137.99 MHz 0630-1800 UT.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

62. * SpaceNews 26-Jul-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 13:45:11 UTC
From: kd2bd@ka2qhd.ocpt.ccur.COM
Message-ID: <$spc0726@ampr.org>
Source record: 28731
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB NEWS @ AMSAT $SPC0726
* SpaceNews 26-Jul-93 *

BID: $SPC0726

=========
SpaceNews
=========

MONDAY JULY 26, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* EARTHQUAKES VIA SATELLITE *
============================
Up to now, earthquakes have been poorly defined because pre-quake and post-quake studies at a large number of sites was simply not possible. But now with the advent of the ERS1 satellite, the situation has changed. ERS1 orbits at a height of 750 kms and views the world via a side scan synthetic aperture radar on a frequency of 5.36 GHz. The satellite was used to study the 28-Jun-92 earthquake centered in Landers, California.

ERS1 collected images of the Landers area 4 times in 1992. Once before the quake, and 3 times after it. Each pixel is 4 x 20 meters and the satellite receiver records both signal range and phase data of the echo returns from the ground. Despite the fact that no two orbits follow exactly the same track, it has proved possible to take the data from runs on 24 April pre-quake and, 7 August post-quake and put them together with a high degree of coherence.

To do this the operators reconstruct the phase of each pixel by minimizing the number of fringes at the corners of the picture, assuming that far field data in the picture corners will be least disturbed by the quake. They then eliminate the stereo path difference using a differential elevation model, and then calculate the interferometric fringes of the image at map coordinates, before resampling to improve overall signal to noise ratio and finally plotting what is basically a ground map covered in color coded fringes where the quake has shifted the surface betwee the pre-quake and post-quake records.

The result is a map of the Landers area overlayed by the "diffraction pattern" of colored fringes. Each fringe can reveal a shift as little as 28mm, that is the half wavelength of the radar. Naturally with such a precise record the middle of the pattern over the fault itself is blurred because even with the small pixel size at the ground of 4 x 20 meters,

there has been a much larger ground shift than 28mm. Nevertheless, the area near the fault has obvious breaks in the surface so a record at that point is hardly necessary, and ERS1 provides a beautiful record out to far beyond the edges of the total affected area.

This ERS1 technique has a precision never seen before. Indeed geologists are now calling for records to be taken by ERS1 of all the world danger spots including volcanoes which swell just before erupting, glaciers having sudden spurts of movement which could foretell large killer landslides as have occured in South America, and of course other active earthquake fault lines.

ERS1 scans the same patch of ground every 35 days. It does not require the positioning of ground stations in remote and often dangerous places. So we should hear more about its successes in the future. ERS1 was built and launched by the European Space Agency/ArianeSpace.

[Info via GM4IHJ]

* UOSAT-OSCAR-11 STATUS *
==========
The following is the On-Board Computer (OBC) status of UoSAT-OSCAR-11 as transmitted by the spacecraft on a frequency of 145.826 MHz and received by KD2BD in New Jersey on 24-Jul-93:

** UoSAT-OSCAR-11 OBC **
Diary Operating System V3.2

Date: 24 /7 /93 (Saturday)
Time: 0 :28 :24 UTC
Auto Mode is selected
Spin Period: + 1394
Z Mag firings: 0
+ SPIN firings: 0
- SPIN firings: 11
SEU count 23923
RAM WASH pointer at E56
WOD commenced 24 /7 /93 at 0 :0 :9
with channels 10 ,11 ,19 ,29 ,
Last Command: 109 to 0 , 0
Attitude control initiated, mode 1
Data collection in progress

UoSAT-OSCAR-11 was designed and built by the Spacecraft Engineering Research Unit of the Electronic and Electrical Engineering Department at the University of Surrey in England. It was launched on March 1, 1984 from Vandenburg Air Force Base in California. Its primary on-board computer is designed around an RCA 1802 microprocessor, and its controlling software is written in the "Forth" computer programming language.

* MAILBAG *
==========
The following message was received via packet radio from XE1RGL in Mexico,

and took nearly two months to be received in New Jersey:

Hello John, my name is Guillermo/XE1RGL. I live in the city of
Cuernavaca, which is located 50 miles south of Mexico city. I am
sending you this message just to say that SpaceNews is a great
information source for hams interested in ham satellite
commmunications. So keep up with the good work and congratulations.
Best wishes for you and yours de Guillermo/XE1RGL.
73's

Thanks for the kind words, Guillermo!

This week a letter was received from Joe Ellis, VK4AGL in Australia, along with a beautiful color photograph of Joe's ham station. Joe asks for help in obtaining slides or photographs of images taken by Voyager and Pioneer for an upcoming presentation to the Queensland Digital Group.

My suggestion would be to get in contact with the Jet Propulsion Laboratory, which is operated for NASA by the California Institute of Technology. The JPL is responsible for the design of the Deep Space Network which communicates with lunar, planetary, and interplanetary missions including the Viking-Mars, Mariner, Voyager, Galileo, and the Venus Orbiting Imaging Radar (VOIR) projects.

Their mailing address is:

JET PROPULSION LABORATORY
Pasadena, California 91103
U.S.A.

Rick, BY1QH, a junior engineering student and the public relations manager of the Tsinghua University Amateur Radio Club (TUARC) in Beijing, China, who is a faithful reader of SpaceNews would like to thank Mr. Ward French, KB1AJF, who kindly offered OSCAR-related books and suggestions in helping Rick and the TUARC to become active on Amateur satellites. Rick wishes to extend his deepest gratitude to Ward and others for their help, and looks forward to working the world through the OSCAR satellites in the near future.

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

BY1QH KB1ZK XE1RGL PA3AYK VK4CNQ VK6XY KA9ITZ

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
UUCP : ...catfish.ocpt.ccur.com!ka2qhd!kd2bd
PACKET : KD2BD @ NN2Z.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

63. Re: APT-Satellites: Report JULY 24, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 16:46:20 UTC
From: ericf@kits.sfu.ca
Message-ID: <1993Jul26.164620.24498@sfu.ca>
Source record: 28733

Hi, I'm new to the world of satellite stuff so please forgive me
if i'm in the wrong place. I would like to know where to get
schematics and software for weather-satellite and telemetry-reception
stuff. I bought the weather satellite hand-book (4th ed) last week and
have been read through it twice. I found it lacking in explicit
information and excessive in the _send_me_money_ department. I don't
have a lot of money to spend on equipmentand I don't mind building
things electronic or mechanical. Dose anyone have any suggestions ?
I have looked in the local libraries and there's not very much info.
Is there somewhere on the net which has schematics, etc ?

All help is greatly appreciated. Thanks.

Eric Fuller
ericf@sfu.ca

64. Re: Staellite Data Formats

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 17:45:23 UTC
From: ae517@Freenet.carleton.ca
Message-ID: <CAs9Bo.Myn@freenet.carleton.ca>
Source record: 28720

>>Could someone tell me some info about the digital formats
>>that the various satellites use?
>
> While my KO-23 download occurs in the other window, let's have a
>short list of them. Of the packet satellites having a mailbox onboard,
>and being currently active, the UO-22 and KO-23 both use the 9600 bps
>FM FSK uplink and downlink. AO-16, LO-19 and FO-20 use 1200 bps FM FSK
>uplink and 1200 bps BPSK (USB) downlink, all AX-25.
> The FO-20 mailbox works like an ordinary BBS, but the Microsat series,
>at least UO-22 and KO-23 use a more efficient way for user interaction.
>The pg and pb software are for upload and download utilizing a broadcast
>protocol so that you can benefit from others downloading software.
>Additionally, the download fills holes in your files so you can
>download a file in multiple sessions.
>
>>What other types of madulation are used? How does one obtain the
>>necessary modems? I haven't seen anything mentioned in the
>
> I built a cheaper than DSP configuration with 2 TNC2S controllers
>adding a 9600 FM/FSK and a 1200 JAS-1 both G3RUH type modems. The
>connecting, both TNC-modem and modem-radio (Kenwood TS-790) both
>required some soldering. The default 1200AFSK modem bypass was not
>a plug and play thing as expected keeping things in the budget :-)
>The 9600 needed the AF filtering bypassed in the rig taking audio
>output directly from the IF unit.
> Hope this simplistic note gives you some ideas how to proceed.
>73 and hpe cu in the packet satellite!
>--
>Jari Malinen jtm@vipu.hut.fi | OH2BBU@krk.fi | OH2BBU@OH2RBG.FIN.EU
>Phone +358-0-597251 Fax +358-0-5091180 - Helsinki U of Technology, Finland -
>

Hey, what happened to all the previous postings on this subject?

Since my last posting on this subject, I was able to interface
my g3ruh to my IC251A and managed to get into the KO-23 "queue"
last night and fill in some file "holes".

I'm able to access the satellite using 12 watts FSK into a
dual-band J-pole for receive and transmit. Now I should track
down a copy of PG so I can upload files, too.

73 de ve3uav@KO23

--

65. What is Phase?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-26 21:21:18 UTC
From: greg@core.rose.hp.com
Message-ID: <CAsJBJ.8wM@icon.rose.hp.com>
Source record: 28723

I could probably look this up if I dug sufficiently, but I'm here and my ARRL handbook isn't...

I've heard the term "phase" applied to satellite orbits, and my PC-TRACK software even tells you, real time, what it is. Nowhere is it defined.

Can anybody enlighten me what this term refers to, and why I should be (or shouldn't be) concerned with it? I've had about a dozen QSOs through RS-10 without this morsel of knowledge.

Thanks,

Greg KD6KGW

66. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 12:37:47 UTC
From: clj@ksr.com
Message-ID: <29920@ksr.com>
Source record: 28730
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

In article <1993Jul24.195047.12141@scorch.apana.org.au>, lukpla@scorch (Luke Plaizier) writes:
[...]
>(80) The following is a long list of trivia tid-bits which comes from the
> December 1987 issue of Space Flight News. It was published as a quizz,
> and the answers were found in the same issue. Only those questions
> worthy of being items of trivia are included.
>(a) This is a list of 'should not have but did' of what some astronauts/
> cosmonauts took into space.
[...]
> (ii) Tom Stafford took a small set of handbells along for the
> Gemini 8 mission, which took place just before Christmas.

Stafford did not fly on Gemini 8. He did fly on Gemini 6 (sometimes called Gemini 6A) which flew in December 1965. It was launched "out of order" after Gemini 7, and rendezvoused with Gemini 7.

>(103) Apollo 1 was scheduled to actually fly in late 1966. As development
> of the black-1 spacecraft progressed, it became apparent that the
block
> Command Module earmarked for the Apollo 1 missions would not be ready
> in time for a tentatively-scheduled joint flight involving the
> tenth and final manned Gemini mission, Gemini 12, in late 1966.
> The tragic Apollo 1 fire occurred in February, 1967.

I recall it happening in late January.

> [Space Flight News, November 1989]
[...]
>(114) Of the Apollo astronauts, nearly all of them are alive. Sadly, Jack
> Swigert was the first Lunar-Orbiting astronaut, and Deke Slayton
> the first Moon Walking astronauts to die.

Jack Swigert flew on Apollo 13, which, although it looped around the moon, never went into orbit. Deke Slayton never flew to the moon -- his one space flight was the Apollo Soyuz Test Project, which was an earth orbiting flight.
--
Chris Jones clj@ksr.com

67. Re: What is Phase?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 14:16:41 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <233dc9INNbf3@newsstand.cit.cornell.edu>
Source record: 28724

In article <CAsJBJ.8wM@icon.rose.hp.com> Greg Dolkas,
greg@core.rose.hp.com writes:
>I've heard the term "phase" applied to satellite orbits, and my PC-TRACK
>software even tells you, real time, what it is. Nowhere is it defined.
>
>Can anybody enlighten me what this term refers to, and why I should be
(or
>shouldn't be) concerned with it? I've had about a dozen QSOs through
RS-10
>without this morsel of knowledge.

If you divide the orbit of a satellite around the earth into 255 equally timed chunks, that is the phase. By definition phase (or it's sometimes called mean anomaly and noted in MA units) is 0 at perigee and 128 at apogee. For low earth orbit satellites like RS10 which have pretty circular orbits and omni directional antennas, phase doesn't matter much. But for the elliptical orbit satellites like oscar 13, it is used to plan the timing of the mode switches. Right now oscar 13 runs mode B from perigee to MA 30, mode S from 30-55, S beacon from 55-60, BS from 60-170 and B only from 170-255. The reason is that for sun angles, the satellite is aimed such that the antennas favor the earth during the rising part of the ellipse, and mode S which has the most directive antennas, has to operate during that window.

So for these kinds of satellites, phase or mean anomaly (MA) acts as a clock tick synched to the orbit. I think for oscar 13 that each phase unit is about 5 minutes long.

Confused the heck out of me when I first ran across it too. Hope that helps. The satellite experimenters handbook is a very good reference for all this stuff BTW.

73 de Kevin, WB2EMS (fkf1@cornell.edu)

68. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 15:28:59 UTC
From: Allan Bourdius <ab3o+@andrew.cmu.edu>
Message-ID: <EgJIave00UhWM3nn0_@andrew.cmu.edu>
Source record: 28725
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

>Jack Swigert flew on Apollo 13, which, although it looped around the moon,
>never went into orbit. Deke Slayton never flew to the moon -- his one space
>flight was the Apollo Soyuz Test Project, which was an earth orbiting flight.
>--
>Chris Jones clj@ksr.com

Sorry, but you're wrong. Apollo 13 HAD to go into lunar orbit because a
short time before the oxygen tank explosion, they conducted a mid-course
correction to take them off a free return trajectory. The accident
occured while Swigert was shutting down SPS systems used during the mcc
burn.

Allan

Allan Bourdius [Applied History/Industrial Management]
PA Rho Chapter of Phi Kappa Theta #017-1051
1069 Morewood Avenue, Pittsburgh, PA 15213
(412) 268-5504 or ab3o+@andrew.cmu.edu
"More geese than swans now live, more fools than wise."

69. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 17:07:16 UTC
From: henry@zoo.toronto.edu
Message-ID: <CAu286.6Mp@zoo.toronto.edu>
Source record: 28727
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

In article <EgJIave00UhWM3nn0_@andrew.cmu.edu> Allan Bourdius <ab3o+@andrew.cmu.edu>
writes:
>>Jack Swigert flew on Apollo 13, which, although it looped around the moon,
>>never went into orbit...
>
>Sorry, but you're wrong. Apollo 13 HAD to go into lunar orbit because a
>short time before the oxygen tank explosion, they conducted a mid-course
>correction to take them off a free return trajectory...

Sorry, Allan, not so. At no time was Apollo 13 in lunar orbit. About
six hours after the tank failure, they did a 30s burn of the LM descent
engine to get back on a free-return trajectory.

>...The accident
>occured while Swigert was shutting down SPS systems used during the mcc
>burn.

Nope, sorry again -- the burn was the previous day. The accident occurred
just after a scheduled TV broadcast from the spacecraft, when Swigert was
asked, quite routinely, to turn on the internal fans in the tanks because
Houston had been having trouble getting good readings from the tank gauges.

References: Murray&Cox, "Apollo"; Cooper, "13: The flight that failed";
NASA SP-350, "Apollo expeditions to the Moon".
--
Altruism is a fine motive, but if you | Henry Spencer @ U of Toronto Zoology
want results, greed works much better. | henry@zoo.toronto.edu utzoo!henry

70. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 17:16:01 UTC
From: fisher@skylab.enet.dec.com
Message-ID: <1993Jul27.171601.20382@jac.nuo.dec.com>
Source record: 28728
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

In article <EgJIave00UhWM3nn0_@andrew.cmu.edu>, Allan Bourdius
<ab3o+@andrew.cmu.edu> writes:
|>>Jack Swigert flew on Apollo 13, which, although it looped around the moon,
|>>never went into orbit. Deke Slayton never flew to the moon -- his one space
|>>flight was the Apollo Soyuz Test Project, which was an earth orbiting flight.
|>>--
|>>Chris Jones clj@ksr.com
|>
|>Sorry, but you're wrong. Apollo 13 HAD to go into lunar orbit because a
|>short time before the oxygen tank explosion, they conducted a mid-course
|>correction to take them off a free return trajectory. The accident
|>occured while Swigert was shutting down SPS systems used during the mcc
|>burn.
|>
|>Allan

Sorry, but *you're* wrong. They did take themselves off a free return
trajectory just before the explosion, but that did not automatically put them in
orbit. It just meant they would not go back to earth in a re-entry corridor.
What they did was to make another mid-course correction to get back into a
re-entry corridor. I'm 90% sure they used the LEM engine (descent stage?) to do
this. I believe the SPS engine was either hosed or deemed not trustworthy
because of the explosion. But they surely did not orbit. That requires the SPS
engine to do a burn behind the moon, not to mention another burn in order to get
back.

Burns

71. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 17:42:12 UTC
From: davem@ee.ubc.ca
Message-ID: <1993Jul27.174212.24051@ee.ubc.ca>
Source record: 28726
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

In article <EgJIave00UhWM3nn0_@andrew.cmu.edu> Allan Bourdius <ab3o+@andrew.cmu.edu>
writes:
>>Jack Swigert flew on Apollo 13, which, although it looped around the moon,
>>never went into orbit. Deke Slayton never flew to the moon -- his one space
>>flight was the Apollo Soyuz Test Project, which was an earth orbiting flight.
>>--
>>Chris Jones clj@ksr.com
>
>Sorry, but you're wrong. Apollo 13 HAD to go into lunar orbit because a
>short time before the oxygen tank explosion, they conducted a mid-course
>correction to take them off a free return trajectory. The accident
>occured while Swigert was shutting down SPS systems used during the mcc
>burn.

Aack! Run, don't walk, to a library and read "13: The Flight That Failed"
by H.S.F. Cooper....

--
Dave Michelson -- davem@ee.ubc.ca -- University of British Columbia

72. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-27 19:18:22 UTC
From: clj@ksr.com
Message-ID: <29973@ksr.com>
Source record: 28729
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

In article <EgJIave00UhWM3nn0_@andrew.cmu.edu>, ab3o+@andrew (Allan Bourdius) writes:
>>Jack Swigert flew on Apollo 13, which, although it looped around the moon,
>>never went into orbit. Deke Slayton never flew to the moon -- his one space
>>flight was the Apollo Soyuz Test Project, which was an earth orbiting flight.
>
>Sorry, but you're wrong. Apollo 13 HAD to go into lunar orbit because a
>short time before the oxygen tank explosion, they conducted a mid-course
>correction to take them off a free return trajectory. The accident
>occured while Swigert was shutting down SPS systems used during the mcc
>burn.

Apollo 13 did not HAVE to go into lunar orbit, and did not. They took the quickest way back, which is completely understandable. To do this, they had to put themselves back on a free return trajectory since, as you point out, they weren't on one (in order to reach their planned landing site, Fra Mauro). But there's no reason on or off earth they would have used fuel to slow themselves into lunar orbit when it could be used to get them back more quickly, and I recall that the return trip was shortened by a day by firing the LM engine some time after the lunar pass.

I believe the last straw that caused the explosion was turning on some heaters to "stir" the liquid oxygen.
--
Chris Jones clj@ksr.com

73. Re: What is Phase?

Newsgroup: rec.radio.amateur.space
Date: 1993-07-28 06:20:13 UTC
From: gary@ke4zv.uucp
Message-ID: <1993Jul28.062013.4484@ke4zv.uucp>
Source record: 28732

In article <CAsJBJ.8wM@icon.rose.hp.com> greg@core.rose.hp.com (Greg Dolkas) writes:
>
>I could probably look this up if I dug sufficiently, but I'm here and my ARRL
>handbook isn't...
>
>I've heard the term "phase" applied to satellite orbits, and my PC-TRACK
>software even tells you, real time, what it is. Nowhere is it defined.
>
>Can anybody enlighten me what this term refers to, and why I should be (or
>shouldn't be) concerned with it? I've had about a dozen QSOs through RS-10
>without this morsel of knowledge.

Phase is the time along the orbit in MA ticks from the last perigee.
For convienence it's expressed as parts in 255 due to the ability
to express that value in 8 bits. It's primarily of interest for
elliptical satellites with directional antennas. Knowing the phase
where the antennas are boresited towards Earth let's you know when
your best chance of having strong signals into the satellite occurs.
For satellites with different operating modes, the phase information
can tell you what mode the satellite will be in. For RS-10 it's
relatively useless since the antennas aren't significantly directional,
the orbit is nearly circular, and there's only one operational mode.

Gary

--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

74. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-07-28 10:30:32 UTC
From: n4hy@tang.ccr-p.ida.org
Message-ID: <N4HY.93Jul28103032@tang.ccr-p.ida.org>
Source record: 28734
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

You are just plain wrong. They burned BEFORE they got to Luna and returned
WITHOUT ENTERING ORBIT. I love it when some know it all jackass makes
a flat statement in your tone of key and the gets caught with his ass over
his shoulders.

Bob
--

Robert W. McGwier | n4hy@ccr-p.ida.org
Center for Communications Research | Interests: amateur radio, astronomy,golf
Princeton, N.J. 08520 | Asst Scoutmaster Troop 5700, Hightstown

75. EME Libration

Newsgroup: rec.radio.amateur.space
Date: 1993-07-28 20:42:07 UTC
From: sutin@helios.ucsc.edu
Message-ID: <236oavINN47v@darkstar.UCSC.EDU>
Source record: 28735

I was just talking with my advisor today who said that he had seen an
article in a recent Natural History Magazine about the origin of lunar
libration. Apparently, in 1120 AD, a monk in Canterbury observed a
meteor impact on the moon. Recent results of the lunar ranging experiment
have found the damping factor for the lunar libration and calculate
the libration to originate from an event in 1120. Just a curiosity --
I haven't looked up the article myself.

Brian Sutin kd6tla sutin@lick.ucsc.edu
Lick Observatory, UCSC Santa Cruz, CA 95064
Fred: "May I rescue you?"
Ginger: "No, thank you. I prefer being in distress."

76. * SpaceNews 02-Aug-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-07-30 16:08:48 UTC
From: kd2bd@ka2qhd.de.com
Message-ID: <$spc0802@ampr.org>
Source record: 28749
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB NEWS @ AMSAT $SPC0802
* SpaceNews 02-Aug-93 *

BID: $SPC0802

=========
SpaceNews
=========

MONDAY AUGUST 2, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is
published every week and is made available for unlimited distribution.

* STS-51 MISSION DELAYED *
==========
Space Shuttle Discovery's STS-51 mission has been delayed once again when
the Ground Launch Sequencer detected an unacceptably slow speed rate of a
hydraulic power unit located inside the Shuttle's righthand solid rocket
booster. Technicians at the Kennedy Space Center troubleshooted last
weekend and a decision was made to remove and replace the hydraulic power
unit and to retest the new system before proceeding with the next launch
attempt.

A new launch date is still to be determined. Managers indicate that another
launch may occur as early as this week.

[Info via NASA]

* MIR QSL NEWS *
==========
The following is from Serge Samburov, RV3DR, the Mir Space QSL Manager.

Dear HAMs! TNX for your QSL.
I confirm your QSO and send to you
QSL from U_MIR (R_MIR) in March 1993:

1-14:VK3CFI,VK6IG,IW1QDZ,KI4TD,KT0H,K2CL,
N0MIR,W0SL,W2IFR,FC1OKN,IV3WLQ,4X4LF,KDX1A,
N2PKF.

I confirm your QSO and send to you
QSL from U_MIR (R_MIR) in April-May 1993:

15-61:SV2AGW,PE1MQC,K0SK,W2LRJ,OZ-OR 2197 (SWL),
ON7QD,ON4APB,KA3AFY,WG0I,N3KYP,WB8IMY,N2JNT,VE7VVW,
ZL2UYH,FC1CDC,G0PWU,5B4ZL,ON2AKJ,F11BYB(SWL),FE6DOK,

EB5IFI,VE5RC,N1FWV,N4QN,LU1MIK,LU1MHG,UA3IFI,ZS2ABF,
G3MFQ,N8KCG,KD4OJD,WN3Z,WA3LKT,WA3TNT,N1NEG,N2RBJ,K4PTB
N2PKF,DE1MSA,FC1GTU,SV8BEV,SV2BNY,14 ICC 666 (SWL),HB9RHV,
HB9SKA,PE1OKI,OH8UV.

I confirm your QSO and send to you
QSL from U_MIR (R_MIR) in June-July 1993:

62 N3KYP-from U6,U8MIR
63 N3NCS-from R2MIR
64 N7SUR-from R2MIR
65 W1AIM -from U5MIR
66 WA1UAY-from R2MIR
67 SM0IIN-from R2MIR
68 VE3UXQ-from R2MIR
69 OZ-DR 2197-from U6MIR
70 ON4ARJ-from R2MIR
71 IW0QEO-from U5MIR
72 VK2ASR-from R2MIR
73 W6NFD -from R2MIR
74 N0UVP -from R2MIR
75 KE5FK -from R2MIR
76 KC4YAU-from U6,U8MIR
77 N0NNK -from R2MIR
78 KQ4AV -from R2MIR
79 FC1SRH-from R2MIR
80 I4AYP -from R2MIR
81 CT1EAT-from R2MIR
82 WA9BVS-from R2MIR

I often receive your letters, which are opened. PSE send me well closed
envelopes with your QSL. PSE send me IRC only from 01.01.1993,
self-addressed envelope with your QSL. PSE send me letter. You can send me
packet MSG: RV3DR@R2MIR-1 or RV3DR@RK3KP.MSK.RUS.EU.

Mir QSLs should be sent to:

RV3DR-Serge Samburov, Space QSL Manager
P.O.141070, BOX 73, Kaliningrad-10 city, Moscow Area,
RUSSIA.

or direct:

P.O.141070,Kaliningrad city, Moscow Area,
prospekt Cosmonavtov, dom 36, kw 96, RUSSIA

For South America, the QSL manager is LW2DTZ. His address is:

Gustavo Carpignano
M.Rosas 2044
1828 - Banfield
Buenos Aires - Argentina

BEST 73

Chief of Cosmonaut Amateur Radio Department NPO "Energia"
RV3DR

* JPL SPACE IMAGE INFORMATION *
==========
As a follow-up to last week's report concerning space images available from the Jet Propulsion Laboratory comes information concerning promotional materials available through the Educational Outreach Center, 818-354-6916. In particular, Peter McClosky, N6TGZ or Gil Yanow, the director of the Center, K6TOS can be contacted as they have educational material packets available for classroom and other similar uses.

Their complete address is:

Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103
U.S.A.

Space images abound on the Internet in many formats, although the Graphical Interchange Format (GIF) seems to be the most popular. Some anonymous FTP sites that carry space related GIF images include (but are not limited to):

ames.arc.nasa.gov
sseop.jsc.nasa.gov
pubinfo.jpl.nasa.gov
sunset.cse.nau.edu

Hopefully some of these sites will carry images taken by the Mars Observer after the spacecraft encounters Mars later this month and begins a 687 day study of the planet's environment during a full Martian year.

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

Kris Nosack KC1CO N3NFK KB4LCI KE5NU WA5FRF KD6MSM N6JLS

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
UUCP : ...catfish.ocpt.ccur.com!ka2qhd!kd2bd
PACKET : KD2BD @ NN2Z.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College

Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

77. ORBS$212.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-07-30 19:35:50 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-212.o@ampr.org>
Source record: 28746
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-212.O
Orbital Elements 212.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX July 31, 1993
BID: $ORBS-212.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93206.01517440
Element set: 10
Inclination: 27.1023 deg
RA of node: 14.2310 deg
Eccentricity: 0.6021479
Arg of perigee: 100.2493 deg
Mean anomaly: 328.8974 deg
Mean motion: 2.05884636 rev/day
Decay rate: -1.21e-06 rev/day^2
Epoch rev: 7604
Checksum: 250

Satellite: UO-11
Catalog number: 14781
Epoch time: 93207.05508281
Element set: 426
Inclination: 97.8101 deg
RA of node: 231.7332 deg
Eccentricity: 0.0010594
Arg of perigee: 232.4917 deg
Mean anomaly: 127.5328 deg
Mean motion: 14.69030856 rev/day
Decay rate: 2.34e-06 rev/day^2
Epoch rev: 50242
Checksum: 281

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93209.49629287
Element set: 635
Inclination: 82.9209 deg
RA of node: 208.0752 deg
Eccentricity: 0.0010989
Arg of perigee: 196.5739 deg
```

Mean anomaly: 163.5032 deg
Mean motion: 13.72320931 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 30551
Checksum: 321

Satellite: AO-13
Catalog number: 19216
Epoch time: 93206.62846982
Element set: 625
Inclination: 57.8808 deg
RA of node: 303.8211 deg
Eccentricity: 0.7222740
Arg of perigee: 320.4229 deg
Mean anomaly: 4.8494 deg
Mean motion: 2.09717309 rev/day
Decay rate: 1.11e-06 rev/day^2
Epoch rev: 3916
Checksum: 300

Satellite: FO-20
Catalog number: 20480
Epoch time: 93201.62045726
Element set: 451
Inclination: 99.0326 deg
RA of node: 51.4678 deg
Eccentricity: 0.0541409
Arg of perigee: 10.9621 deg
Mean anomaly: 350.2744 deg
Mean motion: 12.83220462 rev/day
Decay rate: -8.0e-08 rev/day^2
Epoch rev: 16160
Checksum: 265

Satellite: AO-21
Catalog number: 21087
Epoch time: 93210.63265305
Element set: 820
Inclination: 82.9420 deg
RA of node: 21.4116 deg
Eccentricity: 0.0033930
Arg of perigee: 263.5074 deg
Mean anomaly: 96.2198 deg
Mean motion: 13.74522565 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 12527
Checksum: 277

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93207.07946854

Element set: 411
Inclination: 82.9224 deg
RA of node: 253.2736 deg
Eccentricity: 0.0028626
Arg of perigee: 299.6709 deg
Mean anomaly: 60.1600 deg
Mean motion: 13.74024613 rev/day
Decay rate: 1.8e-07 rev/day^2
Epoch rev: 12386
Checksum: 302

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93205.94934774
Element set: 13
Inclination: 1.1916 deg
RA of node: 122.7676 deg
Eccentricity: 0.2935927
Arg of perigee: 147.8536 deg
Mean anomaly: 237.2358 deg
Mean motion: 1.42201630 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 111
Checksum: 285

/EX
SB KEPS @ AMSAT $ORBS-212.D
Orbital Elements 212.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX July 31, 1993
BID: $ORBS-212.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93200.26473020
Element set: 758
Inclination: 98.6135 deg
RA of node: 284.1842 deg
Eccentricity: 0.0011997
Arg of perigee: 86.8343 deg
Mean anomaly: 273.4178 deg
Mean motion: 14.29782897 rev/day
Decay rate: 6.5e-07 rev/day^2
Epoch rev: 18201
Checksum: 322

Satellite: AO-16
Catalog number: 20439
Epoch time: 93200.26347958
Element set: 563

Inclination: 98.6210 deg
RA of node: 285.0949 deg
Eccentricity: 0.0012487
Arg of perigee: 88.0964 deg
Mean anomaly: 272.1649 deg
Mean motion: 14.29841825 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 18202
Checksum: 327

Satellite: DO-17
Catalog number: 20440
Epoch time: 93200.31985796
Element set: 565
Inclination: 98.6215 deg
RA of node: 285.3710 deg
Eccentricity: 0.0012509
Arg of perigee: 87.3715 deg
Mean anomaly: 272.8894 deg
Mean motion: 14.29978118 rev/day
Decay rate: 5.8e-07 rev/day^2
Epoch rev: 18204
Checksum: 330

Satellite: WO-18
Catalog number: 20441
Epoch time: 93210.22582284
Element set: 568
Inclination: 98.6216 deg
RA of node: 295.2027 deg
Eccentricity: 0.0013101
Arg of perigee: 61.2887 deg
Mean anomaly: 298.9611 deg
Mean motion: 14.29958954 rev/day
Decay rate: 5.4e-07 rev/day^2
Epoch rev: 18346
Checksum: 318

Satellite: LO-19
Catalog number: 20442
Epoch time: 93210.22505746
Element set: 565
Inclination: 98.6219 deg
RA of node: 295.3860 deg
Eccentricity: 0.0013471
Arg of perigee: 60.0285 deg
Mean anomaly: 300.2234 deg
Mean motion: 14.30049234 rev/day
Decay rate: 5.8e-07 rev/day^2
Epoch rev: 18347
Checksum: 280

Satellite: UO-22
Catalog number: 21575
Epoch time: 93209.74914374
Element set: 264
Inclination: 98.4712 deg
RA of node: 285.1895 deg
Eccentricity: 0.0007252
Arg of perigee: 167.9437 deg
Mean anomaly: 192.1925 deg
Mean motion: 14.36841017 rev/day
Decay rate: 6.3e-07 rev/day^2
Epoch rev: 10663
Checksum: 320

Satellite: KO-23
Catalog number: 22077
Epoch time: 93206.06275607
Element set: 108
Inclination: 66.0764 deg
RA of node: 244.8799 deg
Eccentricity: 0.0002837
Arg of perigee: 178.5049 deg
Mean anomaly: 181.5978 deg
Mean motion: 12.86279648 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 4471
Checksum: 322

/EX
SB KEPS @ AMSAT $ORBS-212.W
Orbital Elements 212.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX July 31, 1993
BID: $ORBS-212.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93211.32721354
Element set: 426
Inclination: 99.0965 deg
RA of node: 252.2487 deg
Eccentricity: 0.0016003
Arg of perigee: 48.6447 deg
Mean anomaly: 311.6065 deg
Mean motion: 14.13535123 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 44487
Checksum: 300

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93211.39801714
Element set: 269
Inclination: 98.5158 deg
RA of node: 225.1291 deg
Eccentricity: 0.0012710
Arg of perigee: 184.9629 deg
Mean anomaly: 175.1408 deg
Mean motion: 14.24824559 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 35678
Checksum: 328

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93200.27227550
Element set: 875
Inclination: 82.5421 deg
RA of node: 173.3941 deg
Eccentricity: 0.0018665
Arg of perigee: 38.2724 deg
Mean anomaly: 321.9757 deg
Mean motion: 13.84688369 rev/day
Decay rate: 2.4e-07 rev/day^2
Epoch rev: 27628
Checksum: 327

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93208.38136731
Element set: 49
Inclination: 82.5409 deg
RA of node: 193.5064 deg
Eccentricity: 0.0018693
Arg of perigee: 358.2252 deg
Mean anomaly: 1.8814 deg
Mean motion: 13.16960282 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 24050
Checksum: 293

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93211.36684977
Element set: 177
Inclination: 99.1341 deg
RA of node: 188.0218 deg
Eccentricity: 0.0011682
Arg of perigee: 322.6953 deg
Mean anomaly: 37.3378 deg
Mean motion: 14.12901344 rev/day
Decay rate: 1.55e-06 rev/day^2

Epoch rev: 24977
Checksum: 315

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93203.06277606
Element set: 813
Inclination: 82.5177 deg
RA of node: 47.1178 deg
Eccentricity: 0.0015955
Arg of perigee: 73.4229 deg
Mean anomaly: 286.8683 deg
Mean motion: 13.84340304 rev/day
Decay rate: 5.3e-07 rev/day^2
Epoch rev: 22201
Checksum: 305

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93208.79003080
Element set: 723
Inclination: 82.5537 deg
RA of node: 136.2339 deg
Eccentricity: 0.0017167
Arg of perigee: 18.8483 deg
Mean anomaly: 341.3271 deg
Mean motion: 13.16021447 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18044
Checksum: 273

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93206.28493420
Element set: 566
Inclination: 82.5477 deg
RA of node: 108.1367 deg
Eccentricity: 0.0016581
Arg of perigee: 350.7489 deg
Mean anomaly: 9.3363 deg
Mean motion: 13.84179610 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 15539
Checksum: 316

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93210.81412156
Element set: 606
Inclination: 98.8625 deg
RA of node: 235.8975 deg

Eccentricity: 0.0015884
Arg of perigee: 182.9019 deg
Mean anomaly: 177.2060 deg
Mean motion: 14.01301383 rev/day
Decay rate: -2.59e-06 rev/day^2
Epoch rev: 14855
Checksum: 313

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93205.06017255
Element set: 570
Inclination: 82.5244 deg
RA of node: 47.0530 deg
Eccentricity: 0.0011924
Arg of perigee: 249.7387 deg
Mean anomaly: 110.2501 deg
Mean motion: 13.83554751 rev/day
Decay rate: 3.3e-07 rev/day^2
Epoch rev: 14238
Checksum: 267

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93210.36553160
Element set: 373
Inclination: 82.5307 deg
RA of node: 37.9144 deg
Eccentricity: 0.0016562
Arg of perigee: 279.6116 deg
Mean anomaly: 81.4787 deg
Mean motion: 13.17111359 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10887
Checksum: 288

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93211.36207564
Element set: 634
Inclination: 98.6545 deg
RA of node: 240.6640 deg
Eccentricity: 0.0014077
Arg of perigee: 88.3346 deg
Mean anomaly: 271.9441 deg
Mean motion: 14.22292810 rev/day
Decay rate: 1.91e-06 rev/day^2
Epoch rev: 11478
Checksum: 290

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93210.44515692
Element set: 443
Inclination: 82.5514 deg
RA of node: 344.6616 deg
Eccentricity: 0.0013368
Arg of perigee: 289.4389 deg
Mean anomaly: 70.5288 deg
Mean motion: 13.16823041 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9398
Checksum: 314

/EX
SB KEPS @ AMSAT $ORBS-212.M
Orbital Elements 212.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX July 31, 1993
BID: $ORBS-212.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93210.81908771
Element set: 206
Inclination: 51.6203 deg
RA of node: 5.4136 deg
Eccentricity: 0.0004148
Arg of perigee: 263.8691 deg
Mean anomaly: 96.1866 deg
Mean motion: 15.58987373 rev/day
Decay rate: 7.546e-05 rev/day^2
Epoch rev: 42578
Checksum: 322

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93210.67823012
Element set: 154
Inclination: 28.4681 deg
RA of node: 150.4072 deg
Eccentricity: 0.0004817
Arg of perigee: 132.1464 deg
Mean anomaly: 227.9553 deg
Mean motion: 14.92774815 rev/day
Decay rate: 6.82e-06 rev/day^2
Epoch rev: 17787
Checksum: 294

Satellite: GRO
Catalog number: 21225

Epoch time: 93207.74640736
Element set: 949
Inclination: 28.4542 deg
RA of node: 8.1383 deg
Eccentricity: 0.0005852
Arg of perigee: 55.3608 deg
Mean anomaly: 304.7584 deg
Mean motion: 15.74246025 rev/day
Decay rate: 2.4658e-04 rev/day^2
Epoch rev: 635
Checksum: 300

Satellite: TUBSAT
Catalog number: 21577
Epoch time: 93204.24146351
Element set: 268
Inclination: 98.4712 deg
RA of node: 279.3198 deg
Eccentricity: 0.0005539
Arg of perigee: 186.1160 deg
Mean anomaly: 173.9960 deg
Mean motion: 14.36385425 rev/day
Decay rate: 2.9e-07 rev/day^2
Epoch rev: 10581
Checksum: 309

Satellite: SARA
Catalog number: 21578
Epoch time: 93211.22516422
Element set: 438
Inclination: 98.4772 deg
RA of node: 288.0017 deg
Eccentricity: 0.0005030
Arg of perigee: 161.0696 deg
Mean anomaly: 199.0680 deg
Mean motion: 14.38485425 rev/day
Decay rate: 3.42e-06 rev/day^2
Epoch rev: 10691
Checksum: 290

Satellite: UARS
Catalog number: 21701
Epoch time: 93200.01088054
Element set: 250
Inclination: 56.9851 deg
RA of node: 53.9191 deg
Eccentricity: 0.0005151
Arg of perigee: 111.3468 deg
Mean anomaly: 248.8116 deg
Mean motion: 14.96716847 rev/day
Decay rate: 3.225e-05 rev/day^2

Epoch rev: 10106
Checksum: 267

Satellite: FREJA
Catalog number: 22161
Epoch time: 93208.72179263
Element set: 142
Inclination: 63.0009 deg
RA of node: 33.2780 deg
Eccentricity: 0.0771331
Arg of perigee: 286.3965 deg
Mean anomaly: 65.3656 deg
Mean motion: 13.21647893 rev/day
Decay rate: -6.6e-07 rev/day^2
Epoch rev: 3891
Checksum: 299

/EX

78. ORBS$212.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-07-30 19:37:31 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-212.n1@ampr.org>
Source record: 28747
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-212.N
2Line Orbital Elements 212.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX July 31, 1993
BID: $ORBS-212.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93206.01517440 -.00000121 00000-0 99999-4 0 101
2 14129 27.1023 14.2310 6021479 100.2493 328.8974 2.05884636 76043
UO-11
1 14781U 84 21 B 93207.05508281 .00000234 00000-0 43864-4 0 4269
2 14781 97.8101 231.7332 0010594 232.4917 127.5328 14.69030856502420
RS-10/11
1 18129U 87 54 A 93209.49629287 .00000088 00000-0 89554-4 0 6353
2 18129 82.9209 208.0752 0010989 196.5739 163.5032 13.72320931305519
AO-13
1 19216U 88 51 B 93206.62846982 .00000111 00000-0 99999-4 0 6254
2 19216 57.8808 303.8211 7222740 320.4229 4.8494 2.09717309 39167
FO-20
1 20480U 90 13 C 93201.62045726 -.00000008 00000-0 98486-5 0 4516
2 20480 99.0326 51.4678 0541409 10.9621 350.2744 12.83220462161607
AO-21
1 21087U 91 6 A 93210.63265305 .00000085 00000-0 82656-4 0 8206
2 21087 82.9420 21.4116 0033930 263.5074 96.2198 13.74522565125277
RS-12/13
1 21089U 91 7 A 93207.07946854 .00000018 00000-0 12217-4 0 4116
2 21089 82.9224 253.2736 0028626 299.6709 60.1600 13.74024613123867
ARSENE
1 22654U 93 31 B 93205.94934774 -.00000049 00000-0 99999-4 0 131
2 22654 1.1916 122.7676 2935927 147.8536 237.2358 1.42201630 1113
UO-14
1 20437U 90 5 B 93200.26473020 .00000065 00000-0 33187-4 0 7588
2 20437 98.6135 284.1842 0011997 86.8343 273.4178 14.29782897182019
AO-16
1 20439U 90 5 D 93200.26347958 .00000047 00000-0 26013-4 0 5634
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2 20439 98.6210 285.0949 0012487 88.0964 272.1649 14.29841825182028
DO-17
1 20440U 90 5 E 93200.31985796 .00000058 00000-0 30297-4 0 5653
2 20440 98.6215 285.3710 0012509 87.3715 272.8894 14.29978118182042
WO-18
1 20441U 90 5 F 93210.22582284 .00000054 00000-0 28684-4 0 5686
2 20441 98.6216 295.2027 0013101 61.2887 298.9611 14.29958954183464
LO-19
1 20442U 90 5 G 93210.22505746 .00000058 00000-0 30409-4 0 5654
2 20442 98.6219 295.3860 0013471 60.0285 300.2234 14.30049234183476
UO-22
1 21575U 91 50 B 93209.74914374 .00000063 00000-0 28344-4 0 2646
2 21575 98.4712 285.1895 0007252 167.9437 192.1925 14.36841017106634
KO-23
1 22077U 92 52 B 93206.06275607 .00000000 00000-0 99999-4 0 1080
2 22077 66.0764 244.8799 0002837 178.5049 181.5978 12.86279648 44714
NOAA-9
1 15427U 84123 A 93211.32721354 .00000099 00000-0 62779-4 0 4268
2 15427 99.0965 252.2487 0016003 48.6447 311.6065 14.13535123444879
NOAA-10
1 16969U 86 73 A 93211.39801714 .00000084 00000-0 44096-4 0 2693
2 16969 98.5158 225.1291 0012710 184.9629 175.1408 14.24824559356780
MET-2/17
1 18820U 88 5 A 93200.27227550 .00000024 00000-0 16339-4 0 8759
2 18820 82.5421 173.3941 0018665 38.2724 321.9757 13.84688369276288
MET-3/2
1 19336U 88 64 A 93208.38136731 .00000043 00000-0 99999-4 0 494
2 19336 82.5409 193.5064 0018693 358.2252 1.8814 13.16960282240505
NOAA-11
1 19531U 88 89 A 93211.36684977 .00000155 00000-0 93728-4 0 1770
2 19531 99.1341 188.0218 0011682 322.6953 37.3378 14.12901344249773
MET-2/18
1 19851U 89 18 A 93203.06277606 .00000053 00000-0 42196-4 0 8130
2 19851 82.5177 47.1178 0015955 73.4229 286.8683 13.84340304222014
MET-3/3
1 20305U 89 86 A 93208.79003080 .00000043 00000-0 99999-4 0 7231
2 20305 82.5537 136.2339 0017167 18.8483 341.3271 13.16021447180440
MET-2/19
1 20670U 90 57 A 93206.28493420 .00000051 00000-0 40666-4 0 5660
2 20670 82.5477 108.1367 0016581 350.7489 9.3363 13.84179610155390
FY-1/2
1 20788U 90 81 A 93210.81412156 -.00000259 00000-0 -16016-3 0 6066
2 20788 98.8625 235.8975 0015884 182.9019 177.2060 14.01301383148550
MET-2/20
1 20826U 90 86 A 93205.06017255 .00000033 00000-0 25111-4 0 5701
2 20826 82.5244 47.0530 0011924 249.7387 110.2501 13.83554751142381
MET-3/4
1 21232U 91 30 A 93210.36553160 .00000043 00000-0 99999-4 0 3739
2 21232 82.5307 37.9144 0016562 279.6116 81.4787 13.17111359108878
NOAA-12
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1 21263U 91 32 A 93211.36207564 .00000191 00000-0 94516-4 0 6344
2 21263 98.6545 240.6640 0014077 88.3346 271.9441 14.22292810114786
MET-3/5
1 21655U 91 56 A 93210.44515692 .00000043 00000-0 99999-4 0 4431
2 21655 82.5514 344.6616 0013368 289.4389 70.5288 13.16823041 93988
MIR
1 16609U 86 17 A 93210.81908771 .00007546 00000-0 98148-4 0 2067
2 16609 51.6203 5.4136 0004148 263.8691 96.1866 15.58987373425780
HUBBLE
1 20580U 90 37 B 93210.67823012 .00000682 00000-0 57249-4 0 1548
2 20580 28.4681 150.4072 0004817 132.1464 227.9553 14.92774815177877
GRO
1 21225U 91 27 B 93207.74640736 .00024658 00000-0 16089-3 0 9496
2 21225 28.4542 8.1383 0005852 55.3608 304.7584 15.74246025 6350
TUBSAT
1 21577U 91 50 D 93204.24146351 .00000029 00000-0 16827-4 0 2689
2 21577 98.4712 279.3198 0005539 186.1160 173.9960 14.36385425105810
SARA
1 21578U 91 50 E 93211.22516422 .00000342 00000-0 12566-3 0 4388
2 21578 98.4772 288.0017 0005030 161.0696 199.0680 14.38485425106919
UARS
1 21701U 91 63 B 93200.01088054 .00003225 00000-0 30078-3 0 2503
2 21701 56.9851 53.9191 0005151 111.3468 248.8116 14.96716847101062
FREJA
1 22161U 92 64 A 93208.72179263 -.00000066 00000-0 -84977-5 0 1426
2 22161 63.0009 33.2780 0771331 286.3965 65.3656 13.21647893 38912
```

79. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-08-01 16:41:06 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-744223261@unomaha.edu>
Source record: 28737
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

```
Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
```

arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
==========

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

80. SPACE TRIVIA LIST - 1st August 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-01 21:21:13 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Aug1.212113.1385@scorch.apana.org.au>
Source record: 28736
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

Sorry to saturate you all, but since the last update we've located
another 20 items. Since I'd like to make sure that all gets out as
it's found, here comes another update your way. The last update, by
the way, was mistakenly dated. It was posted on the 30th. My watch
misled me, sorry.

Once more, a small change of plans. The Trivia Update will now always
include the 'Pure Guesswork' section so that we can continually try
and clear up the questions asked there. At the moment, there's only 8
of them, so it's a small penalty. Hopefully this list will be
reduced as we slowly find the answers to those questions.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/??/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way. In this case it is
item 142. It's not much, but at least it's related.

Luke Plaizier - Space Trivia List Moderator

```
*****************************************************************************
*****************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
*****************************************************************************
```

(125) Mike Collins has written some terrific books about the spaceflight
experience. He lost the camera in Gemini 10 (and felt terrible
about it! My favourite quote of his (from Carrying the Fire):
(someone asked him what goes through his mind at 'blastoff') his
reply: "Well,you think about the fact that you are at the top of
6 million parts, all made by the lowest bidder!"
[From quagga@trystero.com aka Cheryl]

(129) A bit of trivia about Jim Lovell: He is the only US astronaut to go
twice to the moon and not land. (Apollo 8 and Apollo 13.) I guess
after Apollo13 he figured it just wasn't in the cards.

(130) The Manned orbiting Laboratory, simply a cylindrical lab attached to
a Gemini spacecraft, was to provide for 30-day missions to orbit
like the early soviet Salyut space stations. The MOL got so far as
having a mock-up launched atop a Titan IIC rocket on November 3, 1966.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(131) The Gemini Spacecraft, mounted on the Manned Orbiting Laboratory as
if the latter were just the upper stage of the launcher, posed some
interesting problems as to how the crew were to transfer from the
Gemini spacecraft down to the cylindrical laboratory. There were
several techniques proposed to do those, namely:-
(1) cutting a hole through the heatshield for the astronauts to pass
hrough
(2) rotating Gemini so as the side hatch was attached directly,
(3) Using an inflatable transfer tunnel or
(4) Extravehicular Activity. (EVA - spacewalk.)
The one chosen was that of cutting a hold through the heat shield,
such that the mock-up that flew in 1966 with a hatch in the heat
shield - successfully recovered in the Atlantic Ocean.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(132) Charles Bassett and Elliott See, prine crew for Gemini 9, were
both killed in an aircraft accident on 28th February, 1966. The
aircraft they were in actually bounced off the building the Gemini
spacecraft was in, smashed into a carpark and exploded.
[Manned Spaceflgiht Log, Tim Furniss.]

(133) Models of the Sputnik space capsule, which took the world's first
man into space, Yuri Gagarin, in 1961, was tested previously as
Sputniks 4, 5, 6, 9 and 10 and was successful 3 of these times.
[Manned Spaceflight Log, Tim Furniss.]

(134) The first orbital flight of the Mercury spacecraft, Friendship 7, was
flown by John Glenn. Unkown to Glenn, a serious problem seemed to
be developing on the ground when controllers noticed that sensors
indicated that his heat shield was loose. Mercury spacecraft had
a neat air-bag which inflated just before splash down, popping off
the heat shield in the process. Controllers to Glenn to keep his
retro-pack on during descent. The pack was held in place by straps,
and these were thought to be able to hang onto the heat shield
during re-entry!

Luckily, the effort seemed to work. Although he saw major
chunks of molten metal during re-entry he splashed-down safely.
[Manned Spaceflight Log, Tim Furniss.]

(135) Lying in Mercury capsule Faith 7 in May 1963, astronaut Gordon
Cooper seemed the most relaxed of all the launch team. He even fell
asleep during the countdown.
[Manned Spaceflight Log, Tim Furniss.]

(136) Pavel Belayev, of the Voskhod 2 mission in March of 1965, succumbed
to a long and serious stomach illness on January 10, 1970, becoming
the first spaceman to die of natural causes.
[Manned Spaceflight Log, Tim Furniss.]

(137) Gordon Cooper was the first man to enter space twice, with a flight
on Mercury-Atlas 9 (The first Mercury-Atlas flight was no 6, with
John Glenn), and Gemini 5.
[Manned Spaceflight Log, Tim Furniss.]

(138) Neil Armstrong and David Scott had a close brush with death in
Gemini 8, when a short circuit in the Gemini control system resulted
in one thruster firing continuously. The spacecraft, at one stage,
was rotating at some 360 degrees per second. With the flying
bedstead incident and the 10-seconds of fuel left on Apollo 11, can
Neil Armstrong be considered a lucky man?
[Manned Spaceflight Log, Tim Furniss.]

(139) Lovell and Aldrin made the first observation of a solar eclipse from
space on Gemini 12, the last of the Gemini flights.
[Manned Spaceflight Log, Tim Furniss.]

(140) As the docking of Soyuz 4 and 5 was achieved on January 16, 1969,
the Soyuz 5 crew shouted "You raped me!". They were subsequently
reprimanded for their choice of words.
[Manned Spaceflight Log, Tim Furniss.]

(141) 3 cosmonauts were launched on Soyuz 5, and just 1 on Soyuz 4. On
landing, Soyuz 4 contained 3 and Soyuz 5 contained 4.
{At launch Soyuz 4 = Vladmir Shatalov, Soyuz 5 = Boris Volynov,
Alexei Yeliseyev and Yevgeni Khrunov.)
Yelisyev and Khronuv were yhe first men to return to Earth in a
craft other than the one in which they were launched.
[Manned Spaceflight Log, Tim Furniss.]

(142)Geoffrey Perry ans team of schoolboys at Kettering Grammar school,
using their small amateur radio setup, were able to tell the rest of
the world the precise point of the end of Soyuz 13 a good hour
before the Soviet statement. This was at a time when the Soviets
were trying to be completely open.
[Manned Spaceflight Log, Tim Furniss.]

(143) The first night-landing of a spacecraft came with the semi-emergency
landing of Soyuz 15 in 1974.

(I think this is so. Can anyone verify this?)

(144) Length Warning....
The joint Apollo-Soyuz mission was a success, but disaster struck the American crew as they descended towards the recovery ship USS New Orleans. Communications difficulties distracted Brand and he forgot to operate the two Earth landing system switches which would deploy the parachutes and deactivate the thursters. When the drogue parachite did not come out, Brand manually commanded it to deploy, but the swinging of the psacecraft caused the still-armed thrusters to fire to correct the oscillations. Stafford noticed this and shut them down, but by then the thrusters' nitrogen tetroxide propellant was boiling off and entering the cabin via a pressure-relief valve. A significant amount of the highly poisonous gas was drawn into the capsule and the astronauts started to cough and choke. The command module then hit the water 'like a ton of brocks' as Stafford described it, and turned upside down. Stafford grabbed the oxygen masks from a locker but by the time he reached Brand the command module pilot was unconscious.
None of the astronauts was killed but the fast-acting gas had turned their lungs white and blistered, and during their recuperation a shadow was found on one of Slaytons Lungs. Fearing cancer, the surgeons decided to operate but found that it was a benign tumor. Had the shadow been found before the flight, Deke Slayton's grounding would most probably have held over and prevented him from making any flight at all.
[Manned Spaceflight Log, Tim Furniss.]

(145) Deke Slayton was the only original Mercury seven astronauts not to make a Mercury flight.
[Manned Spaceflight Log, Tim Furniss.]

(146) The back-up spacecraft for the Apollo-Soyuz flight (Apollo 18 and Soyuz 19) was used on the Soyuz 22 flight, with the androgynous docking equipment replaced by a photography canister.
[Manned Spaceflight Log, Tim Furniss.]

(147) It was the British who developed the 'minimum' satellite launchers of the 1950's. They found that a tank with hemispherical ends, but otherwise with no structural members, when pressurised could act as a load-bearing structure. A series of developments and cancellations in the US finally resulted in the development of the Atlas, with similar developments in the USSR. The astronauts launched on the Atlas in the Mercury project commented that the Atlas felt like a big wobbly baloon just prior to separation from the booster in orbit.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(148) The Gemini spacecraft needed an object to aim for in practising rendezvous techniques necessary for the Apollo missions. They used special Agena Docking Adaptor launched by an Atlas. The Adaptor was essentially a modified Agena stage. The adaptor to be used

on Gemini 9 unfortunately failed to release it's nose shroud
correctly, resulting in the reknown 'Angry Alligator' pictures
of the two half sections of the nose cose apart but unwilling to
move any further.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) NASA was planning at some stage to fly Columbia unmanned so that they
could remove the back-log of payloads waiting to reach orbit.
NASA had 13 old-specification SRBs in storgae at the time.
[Space Flight News, September 1988, but I find this one hard to
believe. That's why it is down here.]

The next three were from a TRUE or FALSE quizz in Space Flight News April
1989 issue. The answers weren't published (as far as I can find) so
I am including the items here so that someone else can tell us which
are true and which are false.

(5) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(6) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(7) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(8) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(255)

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE

Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

81. Satellites on 10 Meters -- Success!

Newsgroup: rec.radio.amateur.space
Date: 1993-08-01 22:31:51 UTC
From: algol@stein.u.washington.edu
Message-ID: <23hg8n$lgv@news.u.washington.edu>
Source record: 28742

Many thanks to all those who answered my post with answers, sug-
gestions, and encouragement. With your help, "Trakstar", "Seesats", and
the article on RS-10 in this month's QST, I managed to find the beacon
and then work K6YK!
The QSO was *very* rough as I twiddled the TX compensating for
doppler and all, but fun, exciting, and not really all *that* difficult.
My set-up needs work to be really effective -- even with the sat-
ellite going right over head my S/N ratio was pretty marginal, and
I have a feeling that a 10 M dipole might be better than a big beam --
but I'm on my way! Thanks again for the help.
73,
Sherm Lovell, WY7F algol@u.washington.edu

82. Two Meter Transmitter for Phase 3D

Newsgroup: rec.radio.amateur.space
Date: 1993-08-02 02:34:01 UTC
From: 70323.2750@CompuServe.COM
Message-ID: <$ans-213.01@ampr.org>
Source record: 28748
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-213.01
TWO-METER TRANSMITTER FOR PHASE 3D

HR AMSAT NEWS SERVICE BULLETIN 213.01 FROM AMSAT HQ
SILVER SPRING, MD AUGUST 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-213.01
2m Transmitter Announcement
AMSAT-UK MEMBER TO BUILD 2M TRANSMITTER FOR PHASE 3D

In a joint statement issued at the recently completed AMSAT-UK Colloquium, Ron Broadbent, G3AAJ, Honorary Secretary of AMSAT-UK, and Ray Soifer, W2RS, Executive Vice President of AMSAT-NA, announced that a 2-meter downlink transmitter for the Phase 3D satellite is to be designed and built by Mike Dorsett, G6GEJ, as part of the international Phase 3D project team. Mike, who met with project leaders including Karl Meinzer, DJ4ZC, and Dick Jansson, WD4FAB, last week in Marburg, Germany, to discuss technical details, described his proposed design at the Colloquium, held at the University of Surrey on July 29 to August 1, 1993.

Together with the 70cm uplink receiver already planned, this means that there will, indeed, be a Mode UV capability (formerly known as Mode B) on the new satellite. If all goes as expected, users of Mode B on AO-13 can look forward to improved performance from Phase 3D.
As soon as the need for a qualified builder became known some months ago, AMSAT-UK and AMSAT-NA worked closely together to identify and screen prospective candidates. Mike Dorsett, G6GEJ, is a well-known designer of high performance VHF/UHF equipment. He is a longtime member of AMSAT-UK and is doing this work strictly on a volunteer basis. Mike's strong technical background will be a welcome addition to the international Phase 3D project team.

/EX

83. APT-Satellites: Report AUG 01, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-02 08:49:25 UTC
From: peter.henne@gmd.de
Message-ID: <1993Aug2.084925.25830@gmd.de>
Source record: 28738
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, AUG 01, 1993

NOAA-9: APT 137.62 On ***
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

*** NOAA-9 mission ENDS now. APT was active 1745 UT
but expect it to be shut down. Farewell NOAA-9!
Meteor 3-4 orbits around the terminator, APT is off.
Meteor 3-3 images suffer from severe brightness-
fluctuations, quality is rather poor.
No other APT-signal 137.00-137.99 MHz 0645-1800 UT.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

84. Mode B on Phase 3D

Newsgroup: rec.radio.amateur.space
Date: 1993-08-02 15:52:56 UTC
From: sford@arrl.org
Message-ID: <1918@arrl.org>
Source record: 28739
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.space

SB SPACE @ ARL $ARLS046
ARLS046 MODE B FOR PHASE 3D

ZCZC AS26
QST de W1AW
Space Bulletin 046 ARLS046
From ARRL Headquarters
Newington, CT August 2, 1993
To all radio amateurs

SB SPACE ARL ARLS046
ARLS046 MODE B FOR PHASE 3D

In a joint statement issued at the AMSAT-UK Colloquium, Ron Broadbent, G3AAJ, Honorary Secretary of AMSAT-UK, and Ray Soifer, W2RS, Executive Vice President of AMSAT-NA, announced that a 2-meter downlink transmitter for the Phase 3D satellite will be designed and built by Mike Dorsett, G6GEJ, as part of the international Phase 3D project team. Mike met with project leaders including Karl Meinzer, DJ4ZC, and Dick Jansson, WD4FAB, last week in Marburg, Germany, to discuss technical details. He also described his proposed design at the Colloquium, held at the University of Surrey on July 29 to August 1, 1993.

Together with the 70-cm uplink receiver already planned, this means that there will indeed be a Mode ''UV'' (formerly known as Mode B) capability on the new satellite. If all goes as expected, users of Mode B on OSCAR 13 can look forward to improved performance from Phase 3D.

G6GEJ is a well-known designer of high-performance VHF/UHF equipment. He is a long-time member of AMSAT-UK and his doing this work strictly on a volunteer basis.

Our thanks to Keith Baker, KB1SF, of AMSAT-NA for providing this information.
NNNN

85. Mode B for Phase 3D

Newsgroup: rec.radio.amateur.space
Date: 1993-08-02 20:15:22 UTC
From: sford@arrl.org
Message-ID: <1924@arrl.org>
Source record: 28740

SB SPACE @ ARL $ARLS046
ARLS046 MODE B FOR PHASE 3D

ZCZC AS26
QST de W1AW
Space Bulletin 046 ARLS046
From ARRL Headquarters
Newington, CT August 2, 1993
To all radio amateurs

SB SPACE ARL ARLS046
ARLS046 MODE B FOR PHASE 3D

In a joint statement issued at the AMSAT-UK Colloquium, Ron Broadbent, G3AAJ, Honorary Secretary of AMSAT-UK, and Ray Soifer, W2RS, Executive Vice President of AMSAT-NA, announced that a 2-meter downlink transmitter for the Phase 3D satellite will be designed and built by Mike Dorsett, G6GEJ, as part of the international Phase 3D project team. Mike met with project leaders including Karl Meinzer, DJ4ZC, and Dick Jansson, WD4FAB, last week in Marburg, Germany, to discuss technical details. He also described his proposed design at the Colloquium, held at the University of Surrey on July 29 to August 1, 1993.

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G6GEJ is a well-known designer of high-performance VHF/UHF equipment. He is a long-time member of AMSAT-UK and his doing this work strictly on a volunteer basis.

Our thanks to Keith Baker, KB1SF, of AMSAT-NA for providing this information.
NNNN
/EX

86. Re: SPACE TRIVIA LIST - 1st August 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-02 21:27:41 UTC
From: reisert@sttng.mlo.dec.com
Message-ID: <1993Aug2.212741.20689@peavax.mlo.dec.com>
Source record: 28741

Does this really need to be posted here? What does it have to do with
Ham Radio?

- Jim AD1C

--
Jim Reisert AD1C Internet: reisert@mlo.dec.com
Digital Equipment Corp. UUCP: ...decwrl!mlo.dec.com!reisert
146 Main Street - MLO3-6/C9 Voice: 508-493-5747
Maynard, MA 01754 FAX: 508-493-0395

87. Satellite Tracking System

Newsgroup: rec.radio.amateur.space
Date: 1993-08-04 15:56:04 UTC
From: flinxwei@magnus.acs.ohio-state.edu
Message-ID: <23om6k$70j@charm.magnus.acs.ohio-state.edu>
Source record: 28743
Cross-posted to: sci.space.shuttle,rec.radio.amateur.misc,rec.radio.amateur.space

I am looking for the ABSOLUTE best tracking system for satellites (mainly the shuttle and OSCARs). What do people recommend for this. I will be running it on a 386DX (souped up, of course). Shareware would definetly be a nice feature.

Please send me any and all suggestions.

Thank you,
-e

Eric Linxweiler, N8UNN President, W8LT
The Ohio State Univeristy The OSU-Amateur Radio Club
W8ZR/R 442.6+

internet: linxweiler.1@osu.edu
packet: n8unn@w8cqk.#cmh.oh.usa.na
TCP/IP: 44.70.0.108
voice: 614/297-8042

88. Re: SPACE TRIVIA LIST - 1st August 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-04 15:59:02 UTC
From: mark@ve6mgs.ampr.org
Message-ID: <1993Aug4.155902.25068@ve6mgs.ampr.org>
Source record: 28750

reisert@sttng.mlo.dec.com (Jim Reisert) writes:

>Does this really need to be posted here? What does it have to do with
>Ham Radio?

Well, Luke is making an effort to ensure only articles that have something to do with Amateur Radio in some way will be posted to rec.radio.amateur.space and rec.radio.info. I feel even if it is a small piece, that the AMSAT, ARIEN and SAREX boys et al will appreciate ... being that I have no Satelite experience or equipment, this group certainly should voice it's opinion on this matter!

The articles will have followups to sci.space, so discussion will not be so `active' in our quiet little groups :-)

If any of you feel that you have information about any of the space related programs that fit into the Trivia list, feel free to submit to Luke, this will certainly place Amateur Radio into the forefront, and improve our PR! Luke has expressed an interest in the above mentioned programs, so drop him a line!

Ciao -- Mark

89. Re: SPACE TRIVIA LIST - 24th July 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-04 16:32:20 UTC
From: henry@zoo.toronto.edu
Message-ID: <CB8txy.62L@zoo.toronto.edu>
Source record: 28744
Cross-posted to: sci.space.shuttle,sci.astro,rec.radio.amateur.space,sci.space

In article <CAzE8A.H7p@trystero.com> quagga@trystero.com (Quagga) writes:
>Henry, it seems to me that Apollo 13 was in a slightly unique trajectory
>which did not allow for a "figure eight" sort of return to the Earth.
>
>Is my memory accurate on this?

Correct. The free-return trajectories used on the early Apollo missions limited the choice of landing site severely: it had to be very close to the lunar equator. Given that the desirable landing sites were mostly outside that area, and that the choice of trajectory was an issue only on the outbound leg -- when Apollo had no less than four different propulsion systems capable of fixing up a bad trajectory (CSM engine, two LM engines, CSM reaction-control system) -- the science-oriented missions starting with Apollo 13 generally did not use free-return trajectories. Apollo 13 was on a so-called "hybrid" trajectory, not a free-return trajectory but close enough that a CSM RCS burn could convert it into one.
--
Altruism is a fine motive, but if you | Henry Spencer @ U of Toronto Zoology
want results, greed works much better. | henry@zoo.toronto.edu utzoo!henry

90. Novatel Cell phone to 902 mhz.

Newsgroup: rec.radio.amateur.space
Date: 1993-08-04 18:55:00 UTC
From: seryb@lims01.lerc.nasa.gov
Message-ID: <23p0m4$kuv@eagle.lerc.nasa.gov>
Source record: 28745

I am posting this request here as many satelite operators are also
vhf enthusiasts. I remember reading an article that said a gropu of hams at
NOVATEL had developed an eprom to convert the popular Novatel cell phone into
a 33 CM transciever. Does anyone remember this posting ar know how I can get
in touch with the NOVATEL ham radio group? Thanks George

Voice # 216-433-8473 "views expressed are personal
☐fax# 216-433-6106 and not those endorsed by NASA"
packet ke8yx@no8m.neoh.usa.na

91. SPACE TRIVIA LIST UPDATE - 5th August, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-04 23:03:51 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Aug4.230351.1560@scorch.apana.org.au>
Source record: 28751
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

I must warn you that some items are not quite in their final form. This list has been posted as it is for the moment to make way for other projects using this system for the next few days, so I wanted to clear the update file area.

It's pretty much hit it's peak now I think. The incoming trivia has slowed down the last day or two, and I myself am getting down to business with other commitments. The last few weeks have been really quite intense, as you can see with the frequency of updates I've been posting. In the last 2 weeks the list has grown quite rapidly, and the change of post format (from full to update) has demanded some extra time from myself in the creating of two files. At this moment I am not absolutely sure that the TRIVIA LIST is perfectly in agreement with the update.

I've also gone through a couple of about-faces with my posting to rec.radio.amateur.space. I have received quite a number of submissions from people who come from that group who found it interesting. Whilst I'm still not sure of the majority consensus of that group, it seems at the moment the benefits of posting there are marginally better than the drawbacks. All followups to that group, though, are forced into sci.space, so readers of the trivia list be warned that this is where your followups will be fed if you are moved to do this.

I haven't heard anything from sci.astro, so I am assuming that it is being well received in that group. Aside from a recent correction, in fact, I can't recall anyone specifically mentioning that the they are posting from sci.astro.....hope all is well.

The latest full list has also just been posted to the two ftp sites.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it will be at one of these sites. I will be updating the complete list to these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro
rec.radio.amateur.space

Luke Plaizier - Space Trivia List Moderator

****
****
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
****
****

(11) This is actually several combined into one, as they are from the
same source. They are fact, but the exact source is unknown at
the moment. Further SSME details have become available, and are
located as items 149 - 162. Anyone with information as to the
source of confirmation or denial of the following items, please
direct email to the moderator.
(a) 2 SSME's could generate as much power as that used by a NIMITZ class
aircraft carrier.
(b) The Fuel and hydrogen pumps of 3 SSME's combined could generate as much
power as that used by the battleship IOWA plus 12 ETHAN class
submarines.
(c) The combustion in 3 SSMEs combined, to make one shuttle flight
system, releases more energy than the combined nuclear
power plants of 9 non-US countries. (but which ones?)
(d) The turbo-pumps on the SSME rotate at 37,000 rpm. Formula One
engines can rotate at up to 15,000 rpm. A standard 1990's
vintage motor vehicle is very lucky to rev to 10,000rpm.
[PLEASE SEE ITEMS 149-152 FOR FURTHER SSME ITEMS]

(19) The Liquid Hydrogen Turbo-Pumps on a Space Shuttle Main Engine weigh
as much as a standard V8 Motor Vehicle engine, but output some 310
times the power. (See also item 150) [SHUTTEL, Nigel MacKnight.]

(128) There was a much cheaper way of launching satellites, according to
McGill University experimenters in 1963. Developing an idea
proposed by Jules Verne, the McGill team used a rebored 50-foot-long
cannon from the battleship USS Washington to loft missiles to an
altitude of 65 miles.
By employing this technique to launch a Martlet rocket, the
McGill experimenters reckoned they could put a 50-pound payload
into orbit for less than the dollar equivalent of 18,000 pounds.
[Item from GUESSWORK that could have True or False. Below is answer.]
True, except that it turns out to be really hard to design a
useful payload that will survive the G-loads. I'm not sure if he was
at McGill, but the person who was involved in the project (HARP) was
a guy called Bull who was later involved in the Iraqi supergun and

ballistic missile projects and was recently killed. "Project HARP"
never put projectiles into ORBIT, just sent them to high ALTITUDES.
[Answered by jcm@urania.harvard.edu (Jonathan McDowell)]
(128a) Jules Verne was not the first guy to propose shooting cannonballs
into space! There's a famous illustration in Newton's *Principia
Mathematica* showing a cannon launching satellites...
[Bill Higgins-- Beam Jockey <HIGGINS@FNALV.FNAL.GOV>]

(130) The Manned orbiting Laboratory, simply a cylindrical lab attached to
a Gemini spacecraft, was to provide for 30-day missions to orbit
like the early soviet Salyut space stations. The MOL got so far as
having a mock-up launched atop a Titan IIIC rocket on November 3, 1966.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(133) Models of the Vostok space capsule, which took the world's first
man into space, Yuri Gagarin, in 1961, were tested previously as
Sputniks 4, 5, 6, 9 and 10 and were successful 3 of these times.
[Manned Spaceflight Log, Tim Furniss.]
Sputnik was a Western name for the early Soviet unpiloted space
satellites, known at that time in the USSR generically as
Iskusstvenniy Sputnik Zemli (Artificial Earth Satellite). The
spacecraft known in the West as Sputniks 4, 5, 6, 9 and 10 were
announced at the time in the USSR as Korabl'-Sputnik 1, 2, 3, 4
and 5. Their internal names were Vostok type 1K nos. 3, 5, 6 and
(the last two) Vostok type 3KA nos. 1 and 2. [Source: Vladimir
Agapov, Moscow]. There were two other Korabl'-Sputnik launches which
failed to reach orbit, so the success rate was 3 out of 7.
[jcm@urania.harvard.edu (Jonathan McDowell)]

(137) Gordon Cooper was the first man to enter orbit twice, with a flight
on Mercury-Atlas 9 (The first Mercury-Atlas flight was no 6, with
John Glenn), and Gemini 5.
[Manned Spaceflight Log, Tim Furniss.]
(137a) Grissom flew on
MR-4/Liberty Bell Seven in 1961 (suborbital) and on Gemini 3 in 1965.
Joe Walker made suborbital spaceflights on the X-15 in 1961 and 1963,
becoming the first in space twice in Jul 1963 and three times in Aug
1963. Joe Engle made his second suborbital X-15 spaceflight a couple
of weeks before Gemini V. [The X-15 flights qualify if space
is considered to start at 80 km, although even if you adopt the FAA
boundary of 100 km Walker's two 1963 flights qualify and make him
beat Grissom].
[jcm@urania.harvard.edu (Jonathan McDowell)]

(148) The Gemini spacecraft needed an object to aim for in practising
rendezvous techniques necessary for the Apollo missions. They used
special Agena Docking Adaptor launched by an Atlas. The original
Adaptor (Not used with Gemini 9)
was essentially a modified Agena stage. The adaptor to be used
on Gemini 9 unfortunately failed to release it's nose shroud
correctly, resulting in the renowned 'Angry Alligator' pictures

of the two half sections of the nose cose apart but unwilling to
move any further.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]
(148a) The GATV (Gemini Agena Target Vehicle) was an Agena D with a TDA
(Target Docking Adapter) on the front. But the GATV for Gemini 9
fell in the ocean on launch. It was replaced by a backup called the
ATDA (Augmented Target Docking Adapter) which was NOT a modified
Agena - it was just the TDA with a cylindrical back end to mate
it straight to the Atlas.
[jcm@urania.harvard.edu (Jonathan McDowell)]

(149) Fifty times a second, the SSME electronic controller evaluates itself
and the engine and then adjusts the engine valves to obtain peak
performance during the Shuttle Orbiter's launch and ascent.

(150) Although not much larger than an automobile engine, the SSME high-
pressure fuel turbopump generates 100 horsepower for each pound of
its weight, while an automobile generates about one-half horsepower
for each pound of its weight.

(151) Each of the 122 high-pressure fuel pump turbine blades, about the
size of a half-dollar, generates 700 horsepower while spinning
at 37,000 rpm.

(152) Rocketdyne's Space Shuttle Main Engines operate at greater temperature
extremes than any mechanical system in common use today. The fuel,
liquid hydrogen, is -423 degrees Farenheit, the second coldest liquid
on Earth, and when burned with liquid Oxygen, the temperature in the
engine's combustion chamber reaches +6000 degrees Farenheit - higher
than the boiling point of iron.

(153) The SSME high-pressure fuel turbopump main-shaft rotates at 37,000rpm
compared to about 3,000rpm for an automobile engine operating at
60mph. (roughly 110km/h)

(154) The maximum equivalent horsepower developed by the three SSME's, is
just over 37 million horsepower.

(155) If water, instead of fuel, were pumped by the three Rocketdyne Space
Shuttle Main Engines, an average family-sized swimming pool could
be drained in 25 seconds.

(156) One Rocketdyne Space Shuttle Main Engine generates enough thrust to
maintain the flight of 2.5 Boeing 747 airliners.

(157) Discharge pressure of an SSME high-pressure fuel turbo-pump could
send a column of liquid Hydrigen 180,000 feet into the air.

(158) The energy released by three of Rocketdyne's Space Shuttle Main
Engines is equivalent to the output of 23 Hoover Dams.

(159) During launch and ascent, the three SSME's empty the half-million
gallon exteranl tank in about 8.5 minutes.

(160) Even though Rocketdyne's Space Shuttle Main Engine weighs one-seventh as much as a locomotive engine, it's high pressure fuel pump alone delivers as much horsepower as 28 locomotives, while its high-pressure oxidizer delivers the equivalent horsepower for 11 more.

(161) The ACTS - Adavanced Communication Technology Satellite, launched on STS-51, will provide the largest transponder throughput ever - 1.0 gigibits per second (GBPS)
[STS-51 Payload Handbook]

(162) The space-suits worn by the original 7 Mercury astronauts were individually tailored to each astronaut. In Schirra's words they required "More alterations than a bridal gown."
[Life in Space, ISBN 0-8094-4900-5]

(163) The 27-year-old test pilot, Yuri Gagarin, of the Soviet Air Force, was jumped from senior lieutenant to Major just before his memorable Vostok flight.
[Life in Space, ISBN 0-8094-4900-5]

(164) Even though Gemini was by far a larger and more sophisticated version of Mercury, A simplified sequencing system - and especially the elimination of the scape tower - reduced the number of relays from 220 in Mercury to 60 in Gemini.
[Life in Space, ISBN 0-8094-4900-5]

(165) Oddly, while everything but metal was badly burned during the tragic Apollo 1 fire, a portion of the flight plan survived with only a few pages singed.
[Life in Space, ISBN 0-8094-4900-5. Page 139, you can see the paper.]

(166) Each of the F-1 engines, used in the first stage of the Saturn V Apollo moon launcher, was about as big as a two-and-a-hald-ton truck, and used three tons of propellants a second.
[Life in Space, ISBN 0-8094-4900-5]

(167) The Saturn V absorbed the know-how and energies of 325,000 people in 12,000 firms. As tall as a 36-story building, it had 11 engines. The five engines that powered the first stage alone were designed to develop 160 million horsepower, the capacity of 86 Hoover Dams.
[Life in Space, ISBN 0-8094-4900-5]

(168) The journalists recording the historic launch of Apollo 11 had to wait some 15 seconds for the noise of the Saturn V ignition to reach them. By that time, the rocket had already risen silently into the air.
[Life in Space, ISBN 0-8094-4900-5]

(169) When Soyuz 19 was launched in July of 1975, for the Apollo Soyuz Test Project, the Soyuz was launched from the same pad that had launched Sputnik some 18 years before.
[Life in Space, ISBN 0-8094-4900-5]

(170) NASA investigated at some stage the possibility of flying Columbia unmanned so that they could remove the back-log of payloads waiting

to reach orbit. NASA had 13 old-specification SRBs in storgae at
the time. Unfortunately, this approach proved unfeasible.
[Space Flight News, September 1988.]

(171) The Mobile Service Structure (MST) at Cape Canaveral LC-40 is believed
to be the world's largest moving building. The 23 story (206 feet)
structure weighs 11.4 million pounds and can move at 50 feet/minute.
LC-40 is used to launch Titan-IV vehicles.
[gregb <gregb@tunfaire.den.mmc.com>]

(172) Sometimes even rocket technicians can overlook the obvious.
Case in point: Alan Shepard's Mercury-Redstone suborbital flight.
Because the expected duration of the flight was 15 minutes, none of
the engineers thought that Shepard would have to "relieve his
bladder" during that time. However, Shepard was strapped into the
Mercury capsule some 3 hours or so before liftoff. After a couple
of hours sitting on his back, Shepard felt the urge to go in a bad
way and asked for "permission to relieve his bladder." After some
debate, the engineers and medical team decided that it was OK for him
to pee in his spacesuit. And this is what he did.
I also suspect that NASA didn't want any negative publicity by
cancelling the launch. The newspapers would have had a field day:
(e.g. "Shepard has to pee, launch cancelled")
Starting with Gus Grissom's flight, strap on urine receptacles
were provided to the Mercury astronauts.
[Tom Wolfe, "The Right Stuff" -
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(173) Since September 1989, Mir has been occupied by cosmonauts continuously
without a break. This date would have been February 1987 except for
a break between Apr 27 and Sep 5 when Mir was left unattended for
awhile. In the future, we may look back and say that Sep 5, 1989,
was the last day that ALL of mankind was residing on Earth!
[Idea from Joe Dellinger <joe@montebello.soest.hawaii.edu> Dates and
Information from jcm@urania.harvard.edu (Jonathan McDowell)]

****
****
* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
****
****

(5) Von Braun was one of the most far-sighted men in human history. The
rocket he designed for the V-2 worked perfectly, he told a friend
when the first V-2's hit London, except that they landed on the
wrong planet!
[Life in Space, ISBN 0-8094-4900-5]

(6) Gemini 3's lift-off was reportedly so smooth that neither of the
astronauts felt anything - the starting of the mission clock
on the instrument panel alerted them.
[Life in Space, ISBN 0-8094-4900-5]

(7) One of the CapCom's during the recovery of (I think) Apollo 15 said
(roughly): "we can bring these things down in Clear Lake if we want".
[aws@iti.org (Allen W. Sherzer)]

****
****
* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-

effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first Moonwalker. In 1963, his place in the history books was under seige from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard had broken the world's land speed record in a rocket propelled sled, and had been banned from playing noughts-and-crosses with visitors because he usually won!
The chances are that if a monkey had been selected to fly to the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a study was conducted into the viability of employing a 'vacuum cleaner' type device in Low-Earth orbit to collect some of the particles of Moonrock (tectites) that are dislodged from the lunar surface by annual meteorite showers and sometimes find their way to the Earth's surface.
Collected in orbit and returned to Earth by parachute, samples gathered in this way would be free from the contamination caused by passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true? 1978-1986 the rumor was that if ejected at 100 Kft then you would drift up to 200 Kft before falling back. During the fall, the aero heating would become so intense that helmet melting would be likely. I'd love to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(8) One of my favorite stories (though you should probably check out the veracity of it) is in regards to the Apollo program. Several of the early launches were on Little Joe II rockets, which were solid fuel boosters, and were designed mainly to test the escape tower system. The Little Joe II rocket was described by one NASA official as being "the most reliable booster we've ever built". On the last such flight, the fuel charge in the Little Joe II shattered several seconds before the scheduled test of the escape tower, creating a true emergency for the escape tower to handle (the escape tower worked perfectly). The Little Joe II launches, by the way, took place at White Sands Missle range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(9) Is there any truth to the rumor that Dick Nixon ordered all plans for the Saturn V destroyed so that they wouldn't fall into the hands of the Soviets?
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(10) At one time, the Gemini space craft was going to land on land rather than on water, with a rather bizzare inflatible "hang-glider" instead of parachutes. (I remember having a NASA publication when I was a kid that had drawings of this configuration. It even showed the storage compartment for the inflatible wing running between the two

hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
(Can anyone come up with some sources for backing up/refuting the last
three items?)

****

(255)

92. Re: Satellite Tracking System

Newsgroup: rec.radio.amateur.space
Date: 1993-08-05 03:01:31 UTC
From: gws@n8emr.cmhnet.org
Message-ID: <1993Aug05.030131.9857@n8emr.cmhnet.org>
Source record: 28752
Cross-posted to: sci.space.shuttle,rec.radio.amateur.misc,rec.radio.amateur.space

In article <23om6k$70j@charm.magnus.acs.ohio-state.edu> flinxwei@magnus.acs.ohio-state.edu (Eric Linxweiler) writes:
>I am looking for the ABSOLUTE best tracking system for satellites (mainly the
>shuttle and OSCARs). What do people recommend for this. I will be running it
>on a 386DX (souped up, of course). Shareware would definetly be a nice
>feature.

Best in what? Price? PD or pay.. User interface? a UI is more of a
personal choice than anything else. What do you want a graphical or
a numeric output. Size of machine is of little importance if you
just want the software to tell you when its within view. What antennas
will you be using, What OSCAR's? If your antenna has a 20deg
wide beam pattern and your working AO13 you want the antenna
pointing in the general direction. If you just want to hear
the suttle on your HT or scanner using a duck all you want is
something to tell you when the craft is in the area. I have not
purchased yet, but I like the track boxes that are out. I dont
want to waste my CPU to tell me when a sat is near, just flash a
light beep and pont my antennas.

--
Gary W. Sanders gws@n8emr.cmhnet.org, 72277,1325
N8EMR @ N8JYV (ip addr) 44.70.0.1 [Ohio AMPR address coordinator]
HAM BBS 614-895-2553 (1200/2400/V.32/PEP) Voice: 614-895-2552 (eves/weekends)

93. Status of Dove and Mir?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-06 00:13:42 UTC
From: kb2glo@cbnewsj.cb.att.com
Message-ID: <CBB9yw.F2t@cbnewsj.cb.att.com>
Source record: 28753

The subject line says it all...

Is Dove sending packet telemtry? Voice yet?

Is Mir packet active if so is it every day or only weekends?
BTW what type of contact do I need to make with MIR to be able
to get a QSO. Does entering a message count?

Thanks and 73, Tom KB2GLO.

--
Tom Kenny, KB2GLO
UUCP: ...!att!lzusp!tek Internet: tek@lzusp.att.com
Packet Radio: KB2GLO@KB2GLO.NJ.USA Voice Telephone: 908-576-3888

94. Satelite-Navigation-Systems, Infos wanted.

Newsgroup: rec.radio.amateur.space
Date: 1993-08-06 11:52:44 UTC
From: melody@chamber.in-berlin.de
Message-ID: <1993Aug6.115244.11624@chamber.in-berlin.de>
Source record: 28755
Cross-posted to: rec.radio.amateur.space,sci.misc

Hi,

please excuse if this is not exactly the right groups to ask,
but I expect it as the best to do so ...

I'm looking for information about devices which might be able to
determine exact position (in degrees, X north, Y west ...) via
satelite information. I think navigation systems on ships or
airplanes do such work, and I know that someone on a lokal
university has determined exact position of our amateur-radio
club station with a scanner-like device from the roof of the
building. As he reported on a pinboard, he used 4 satelites
to come to this kind of information.

So my questions are: are there such 'scanners', where to get them,
how expensive are they, is it legal to do so, how does it work,
does it work everywhere on every time you want ?

ANY information welcome, please via e-mail.

Melody.

--
-*- Melody Jennifer Conner -*- melody@chamber.in-berlin.de -*-
In times of trouble may your hearts be strong - We wish you well (Whitesnake)

95. Re: Status of Dove and Mir?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-06 16:52:18 UTC
From: sford@arrl.org
Message-ID: <1989@arrl.org>
Source record: 28754

In rec.radio.amateur.space, kb2glo@cbnewsj.cb.att.com (thomas.kenny) writes:
>The subject line says it all...
>
>Is Dove sending packet telemtry? Voice yet?
>
>Is Mir packet active if so is it every day or only weekends?
>BTW what type of contact do I need to make with MIR to be able
>to get a QSO. Does entering a message count?
>
>Thanks and 73, Tom KB2GLO.
>

DOVE is still off the air on 2 meters, but that may change soon.
The controllers have been making headway using DSP techniques
to assist in monitoring DOVE's S-band downlink signal. As a
result, they've been able to run a systems check and a few other
functions. The spacecraft appears to be in good health. If they
are able to upload new software, DOVE may be talking and sending
packet telemetry within a few weeks or months.

The Mir cosmonauts keep an erratic, unpredictable schedule. Generally
speaking, they operate after 2100 *Moscow time*. They've been very
busy with mission assignments, however, so their operating time
has been limited. To snag a Mir QSL card, you must make a voice
QSO, although this requirement may change.

Check the Amateur Satellite Communications column in the September
issue of QST for more Mir QSL info.

73...Steve, WB8IMY
American Radio Relay League

96. APT-Satellites: Report AUG 07, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-09 08:17:55 UTC
From: peter.henne@gmd.de
Message-ID: <1993Aug9.081755.21739@gmd.de>
Source record: 28756
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, AUG 07, 1993

NOAA-9: APT 137.62 *OFF*; BCN 137.77 On
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

Even the telemetry-beacon of NOAA-9 will be switched
off in the near future, the spacecraft-mission ended.
No other APT-signal 137.00-137.99 MHz 0700-1800 UT.
```


```
+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

97. Moonbounce or meteor scatter, which is easier ?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-09 08:40:23 UTC
From: youngqud@ucs.orst.edu
Message-ID: <2452hn$ed@gaia.ucs.orst.edu>
Source record: 28757
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

I've become interested in sending VHF signals between Corvallis, Oregon
and Everett, Washington. Of course, these 2 points are out of range
of each other for conventional point to point VHF signals. If I
were to focus on moon bounce or meteor scatter propagation, which
do you suppose would be easier to acomplish ?

youngqud@ucs.orst.edu Dean Youngquist
N7LPE youngqud@ucs.orst.edu
428 N.W. 9th Street Corvallis, Oregon 97330

98. Re: Moonbounce or meteor scatter, which is easier ?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-09 16:32:14 UTC
From: glenne@sad.hp.com
Message-ID: <CBI39r.7qA@srgenprp.sr.hp.com>
Source record: 28758
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

Dean Youngquist (youngqud@ucs.orst.edu) wrote:
: I've become interested in sending VHF signals between Corvallis, Oregon
: and Everett, Washington. Of course, these 2 points are out of range
: of each other for conventional point to point VHF signals. If I
: were to focus on moon bounce or meteor scatter propagation, which
: do you suppose would be easier to acomplish ?

Dean,

I've done both and meteor scatter is far easier. In fact, with a low
to moderate gain antenna and 100-200 watts you may very well be able to
find enough to scatter your signal from to allow you to work "direct".
They may not be as "out of range" as you think. I've worked British
Columbia as well as Tacoma on meteor scatter more than once. I believed
I worked VE7ANP years ago on routing meteor schedules when he was
running only 100 watts.
I suspect that with high power and reasonable antennas on 6M that you
could work it pretty reliably, perhaps even all the time on SSB. The
"6M early morning crowd" has used troposcatter which is enhanced by extra
meteor activity to work up and down the west coast (at least). I don't
know if they are still active on weekend mornings or not.

Getting a station that can hear its own echos from the moon is a lot
more work (but fun).

73
Glenn Elmore n6gn

N6GN @ K3MC
amateur IP: glenn@SantaRosa.ampr.org
Internet: glenne@sr.hp.com

99. Re: Moonbounce or meteor scatter, which is easier ?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-09 17:21:07 UTC
From: garym@alsys.com
Message-ID: <1993Aug9.172107.3936@alsys.com>
Source record: 28759
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

In <2452hn$ed@gaia.ucs.orst.edu> youngqud@ucs.orst.edu (Dean Youngquist) writes:
>I've become interested in sending VHF signals between Corvallis, Oregon
>and Everett, Washington.
>... If I
>were to focus on moon bounce or meteor scatter propagation, which
>do you suppose would be easier to acomplish ?

I'm not sure of the distance between those two points but how about
tropo-scatter? That might be even easier for the distance involved but
I don't know if it works at VHF, I've only used it on UHF (2-4 Ghz).
--GaryM
--
Gary Morris KK6YB Internet: garym@alsys.com
San Diego, CA USA Phone: +1 619-457-2700 x128 (work)

100. Re: Moonbounce or meteor scatter, which is easier ?

Newsgroup: rec.radio.amateur.space
Date: 1993-08-09 20:59:58 UTC
From: dave@llondel.demon.co.uk
Message-ID: <744955198snx@llondel.demon.co.uk>
Source record: 28814
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

In article <2452hn$ed@gaia.ucs.orst.edu> youngqud@ucs.orst.edu (Dean Youngquist) writes:
> I've become interested in sending VHF signals between Corvallis, Oregon
> and Everett, Washington. Of course, these 2 points are out of range
> of each other for conventional point to point VHF signals. If I
> were to focus on moon bounce or meteor scatter propagation, which
> do you suppose would be easier to acomplish ?
The position of the moon probably has a lot to do with it..... like if it is
below the horizon you might find moonbounce difficult :-)

If you want to try MS then I suggest 6M is a good band to look at because
even just listening to a DX beacon frequency you can hear all sorts of
meteor pings, some of which last quite a while.

Dave

****
* G4WRW @ GB7WRW.#41.GBR.EU AX25 * You think *you* have problems? *
* dave@llondel.demon.co.uk Internet * What do you do if you *are* *
* g4wrw@g4wrw.ampr.org Amprnet * a manically depressed robot?? *
****

101. Planetary Software

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 00:05:02 UTC
From: kss@spc2ed0.nswses.navy.mil
Message-ID: <35392@suned1.Nswses.Navy.MIL>
Source record: 28812

I am looking for some shareware that has been generated to determine the position of the SUN or other planets given my position and time of day. Problem started when I attempted to point my antennae at the SUN and the day was very overcast. More information available if needed.

--Scott

---

kss@suned1.NSWSES.Navy.MIL kss@suned1.uucp
Any statements / opinions made here are mine, alone, not the Navy's.
HAVE A GOOD ONE!

102. Meteori scatter and Troposcatter

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 00:08:10 UTC
From: tjonz@caliban.Corp.Sun.COM
Message-ID: <246ota$971@jethro.Corp.Sun.COM>
Source record: 28760
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

youngqud@ucs.orst.edu (Dean Youngquist) writes:

> I've become interested in sending VHF signals between Corvallis,
> Oregon and Everett, Washington....If I were to focus on moon bounce
> or meteor scatter propagation, which do you suppose would be easier
> to acomplish ?

glenne@sad.hp.com (Glenn Elmore) replies:

> I've done both and meteor scatter is far easier.

It sounds like Dean is looking for a reliable path, and Glenn recommends meteor scatter, which surprised me. I had the impression that meteor scatter was a very occasional thing, like when the Persieds or Leonids were in town. Is this not the case? If I were to work nothing other than meteor scatter, how many hours would I be able to work during and "average" week? Glenn continues:

> The "6M early morning crowd" has used troposcatter which is enhanced
> by extra meteor activity to work up and down the west coast

Troposcatter? Is this what happens when little bits of tropo re-enter the atmosphere? (:^) Seriously, this is a new term to me. Are troposcatter and troposheric ducting related? How about sporadic E? As I recall from junior high school science class, the troposephere is the lowest layer of the atmosphere. I also seem recall reading that the curent theory about the source of sporadic E skip is clouds of ionized particles produced when two large air masses rub against one another during wind shear conditions. Is this the same as troposcatter? Is it also more common than I expect? From Glenn's description of the 6M crowd, it would appear so.

Todd, KB6JXT

103. Speaking of meteors...

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 00:42:36 UTC
From: algol@stein.u.washington.edu
Message-ID: <246qts$rqu@news.u.washington.edu>
Source record: 28811

Speaking of meteors, remember the Perseids shower Wednesday night.
This MAY be a big one, as we pass through the remnants of the recently passed
comet Swift-Tuttle. The predicted peak is just before sunset here on the
west coast :(but I'm gonna be out there as soon as it's dark. (I'd rather
watch them than bounce rf off them -- each to his own.)

Could a ham in Corvalis link into the Northwest Intertie? There was
an article about this system of linked repeaters in QST about 2 years ago.
As I recall it goes from Canada to Oregon, the Pacific to Montana. Of
course than's much less sporting that meteor scatter or EME....

--Sherm Lovell, WY7F algol@u.washington.edu

104. TRACKING SOFTWARE FOR SUN WORKSTATIONS

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 02:31:29 UTC
From: manfred@isi5.ssl.berkeley.edu
Message-ID: <2471a1$1sl@agate.berkeley.edu>
Source record: 28813
Cross-posted to: sci.space.shuttle,rec.radio.amateur.space

SatTrack V1.7 Release

The latest version of the satellite tracking program I've written for Unix machines is pretty much ready to be used. I hope most of the bugs have been found (at least the remaining ones ought to be of minor impact). You can get SatTrack from ucsd.edu (128.54.16.1). Do the following:

```
ftp ucsd.edu
login anonymous
cd hamradio/packet/tcpip/incoming
get sattrack.V1.7.tar.Z
```

Place this file into your Unix home directory, uncompress it, and then type 'tar xvpf sattrack.V1.7.tar'. This will unbundle the distribution file and create all subdirectories that are necessary. Then look into the documentation file 'sattrack.doc' in SatTrack/Doc for instructions how to compile sattrack (and some other auxiliary programs). Please let me know how it works and if there are any bugs that I haven't encountered yet. It should compile perfectly on at least Sun-3's (SunOS 4.0.3) and SPARCstation IPCs (SunOS 4.1.1). Some machines require stdlib.h to be included. In this case comment out the line

```
#define SUNOS4
```

in sattrack.h before compilation. I hope this program is helpful to you.

73, Manfred --- W6/DL5KR

Manfred Bester
Space Sciences Lab
University of California
Berkeley, CA 94720
(510) 642-8497
e-mail: manfred@ssl.berkeley.edu

105. Kepler Elements via the Internet

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 14:06:08 UTC
From: nigel@cotswold.demon.co.uk
Message-ID: <745020368snx@cotswold.demon.co.uk>
Source record: 28817

Before anyone says I have checked for an FAQ and not found one. Is it possible to obtain kepler elements via the Internet?

106. Re: Satelite-Navigation-Systems, Infos wanted.

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 14:40:54 UTC
From: Bruce Taylor <blt+@CMU.EDU>
Message-ID: <ggNvBqO00UzxQ1x2VE@andrew.cmu.edu>
Source record: 28815
Cross-posted to: sci.misc,rec.radio.amateur.space

Dear Melody,

Your friend probably used the US 'GPS' or Global Positioning Service,
or possibly the Russian version called GLONASS.

I'm not an expert on this, but I believe that both systems operate by
having satellites constantly transmitting information (very precise
time, and a satellite ephemeris or position table), which the receiver
uses to establish a user's location. The user only receives information
-- nothing is transmitted except by the satellites.

It is legal to use this any time, anywhere, at least in the USA.
Other countries may limit the use of radio receivers.

You can estimate your position in two dimensions quite well, under 200
metres. The US version has a dithering feature which the military
controls. When that feature is off, you can get a 2D position to
perhaps 20 metres. Information on vertical position is also available,
but requires more satellites be received, and is generally slightly less
precise.

Costs of the GPS receivers are dropping rapidly. Boating supply
houses may be a good place to look. In US dollars, prices seem to range
from perhaps USD$600 through USD$2,000. The high end is for units which
are intended for aircraft, or that have other specialized features.

Sony, Trimble, and others make units for the US market -- I'm sure
that there are many other manufacturers elsewhere.

- Bruce Taylor (blt+@cmu.edu)

107. Re: Meteori scatter and Troposcatter

Newsgroup: rec.radio.amateur.space
Date: 1993-08-10 18:03:18 UTC
From: paulf@Csli.Stanford.EDU
Message-ID: <1993Aug10.180318.29231@Csli.Stanford.EDU>
Source record: 28816
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

tjonz@caliban.Corp.Sun.COM (Todd Jonz) writes:

>It sounds like Dean is looking for a reliable path, and Glenn recommends
>meteor scatter, which surprised me. I had the impression that meteor scatter
>was a very occasional thing, like when the Persieds or Leonids were in town.
>Is this not the case? If I were to work nothing other than meteor scatter,
>how many hours would I be able to work during and "average" week?

Well, now that all depends on a number of factors. If you rely on shower
meteors (known in the MBC world as "overdense"), then you're correct, the
time between pings is quite long. Most MBC systems, however, rely on
underdense meteors, which are the result of collisions with cosmic dust, and
which are far more frequent (10^14 per day). The exact equations are in
the CCIR Green Books.

--
-=Paul Flaherty, N9FZX | "The National Anthem has become The Whine."
->paulf@Stanford.EDU | -- Charles Sykes, _A Nation of Victims_

108. ARRL Keplerian Bull 31

Newsgroup: rec.radio.amateur.space
Date: 1993-08-11 01:22:55 UTC
From: marcbg@feenix.metronet.com
Message-ID: <$arlk031@ampr.org>
Source record: 28818
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEP @ ARL $ARLK031
ARLK031 Keplerian data

ZCZC SK43
QST de W1AW
Keplerian Bulletin 31 ARLK031
From ARRL Headquarters
Newington, CT August 7, 1993
To all radio amateurs

SB KEP ARL ARLK031
ARLK031 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM
AO-10
1 14129U 83058 B 93213.29958827 -.00000057 99999-4 0 126
2 14129 27.0845 13.1793 6019675 102.0313 327.9153 2.05879730 48220
RS-10/11
1 18129U 87054 A 93216.49568542 0.00000088 89554-4 0 6378
2 18129 82.9206 202.9005 0011417 176.6998 183.4224 13.72321222306477
UO-11
1 14781U 84021 B 93215.16055773 0.00000214 40399-4 0 4271
2 14781 97.8101 239.4802 0010858 202.8016 157.2703 14.69034577503614
RS-12/13
1 21089U 91007 A 93207.07946854 0.00000018 12217-4 0 4115
2 21089 82.9224 253.2736 0028626 299.6709 60.1600 13.74024613123867
AO-13
1 19216U 88051 B 93217.59545265 0.00000108 99999-4 0 6279
2 19216 57.8475 301.8431 7220699 321.2134 4.8415 2.09717597 7891
UO-14
1 20437U 90005 B 93200.26473020 0.00000065 33187-4 0 7587
2 20437 98.6135 284.1842 0011997 86.8343 273.4178 14.29782897182019
AO-16
1 20439U 90005 D 93200.26347958 0.00000047 26013-4 0 5633
2 20439 98.6210 285.0949 0012487 88.0964 272.1649 14.29841825182028
DO-17
1 20440U 90005 E 93200.31985796 0.00000058 30297-4 0 5652
2 20440 98.6215 285.3710 0012509 87.3715 272.8894 14.29978118182042
```

```
WO-18
1 20441U 90005 F 93210.22582284 0.00000054 28684-4 0 5685
2 20441 98.6216 295.2027 0013101 61.2887 298.9611 14.29958954183464
LO-19
1 20442U 90005 G 93210.22505746 0.00000058 30409-4 0 5653
2 20442 98.6219 295.3860 0013471 60.0285 300.2234 14.30049234183476
FO-20
1 20480U 90013 C 93213.62679476 -.00000013 15582-6 0 4527
2 20480 99.0320 61.1953 0541077 343.7838 14.6522 12.83220426163149
AO-21
1 21087U 91006 A 93216.82011135 0.00000085 82656-4 0 8224
2 21087 82.9421 16.8307 0034000 245.4913 114.2681 13.74523018126125
UO-22
1 21575U 91050 B 93209.74914374 0.00000063 28344-4 0 2645
2 21575 98.4712 285.1895 0007252 167.9437 192.1925 14.36841017106634
KO-23
1 22077U 92052 B 93215.15967061 0.00000000 99999-4 0 1092
2 22077 66.0762 225.8331 0001975 176.3527 183.7504 12.86279633 45884
Mir
1 16609U 86017 A 93217.80596446 0.00006978 90709-4 0 2203
2 16609 51.6209 330.3117 0003838 301.5056 58.5692 15.59078826426870
STS-51 8/12
1 99999U 93999 A 93224.57800809 0.00044522 13742-3 0 11
2 99999 28.4677 350.2224 0004369 287.2921 311.3445 15.91027394 15

Keplerian bulletins are transmitted twice weekly from W1AW.
The next scheduled transmission of these data will be Tuesday,
August 10, 1993, at 2230z on Baudot, AMTOR and ASCII.
NNNN
/EX
```


```
--
Marc B. Grant, N5MEI | marcbg@feenix.metronet.com | 214/231-3998 (voice)
P.O Box 850472 | marcbg@esy.com | 214/231-0025 (fax)
Richardson, TX 75085 | |
```

109. Re: Kepler Elements via the Internet

Newsgroup: rec.radio.amateur.space
Date: 1993-08-11 10:51:40 UTC
From: seeler@UPEI.CA
Message-ID: <seeler.31.745066300@UPEI.CA>
Source record: 28820

In article <745020368snx@cotswold.demon.co.uk> nigel@cotswold.demon.co.uk (Nigel Roles) writes:
>From: nigel@cotswold.demon.co.uk (Nigel Roles)
>Subject: Kepler Elements via the Internet
>Date: Tue, 10 Aug 1993 14:06:08 +0000
>Before anyone says I have checked for an FAQ and not found one. Is it possible
>to obtain kepler elements via the Internet?

Try archive.afit.af.mil (129.92.1.66) in the subdirectory /pub/
space/ .

73 Dave VY2DCS

110. Re: Satelite-Navigation-Systems, Infos wanted.

Newsgroup: rec.radio.amateur.space
Date: 1993-08-11 11:17:14 UTC
From: roland@email.tuwien.ac.at
Message-ID: <930811111714@afthit02.tuwien.ac.at>
Source record: 28819
Cross-posted to: sci.misc,rec.radio.amateur.space

In article <ggNvBqO00UzxQ1x2VE@andrew.cmu.edu> blt+@CMU.EDU (Bruce Taylor) writes:

At the moment in the newsgroup "de.sci.misc" there is a diskussion
about this topic.

Roland

--
[Roland BAUER, Abt. Foerdertechnik, Getreidemarkt 9, A-1060 Vienna / Europe]
[tel: +43(222)58-801/4861, fax: +43(222)586-58-47, bauer@afthp001.tuwien.ac.at]
[--- Technische Universitaet Wien, Institut fuer Allgemeine Maschinenlehre ---]
[---------- und Foerdertechnik, Abteilung Foerdertechnik (E321/2) ------------]

111. Re: Meteori scatter and Troposcatter

Newsgroup: rec.radio.amateur.space
Date: 1993-08-11 16:28:41 UTC
From: garym@alsys.com
Message-ID: <1993Aug11.162841.21840@alsys.com>
Source record: 28821
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space,rec.radio.amateur.misc

In <246ota$971@jethro.Corp.Sun.COM> tjonz@caliban.Corp.Sun.COM (Todd Jonz) writes:
> > The "6M early morning crowd" has used troposcatter which is enhanced
> > by extra meteor activity to work up and down the west coast

>Troposcatter? Is this what happens when little bits of tropo re-enter the
>atmosphere? (:^) Seriously, this is a new term to me. Are troposcatter and
>troposheric ducting related?

I'm not sure what property of the Troposphere causes troposcatter propagation but it is a weak signal mode where you get forward scattering of your signal over the horizon, giving a range of up to about 500 miles on 6m, it is usable on VHF, UHF and SHF. Troposcatter propagation is subject to fast and slow fading.

I used to maintain a tropo link as part of a military phone system. It was a wideband (100+ Khz) FM signal on 2.3 GHz and the two sites were 98 miles apart. With the high power we used and the space and polarity diversity we were able to maintain a 60 dB S/N on our voice circuits with a 99.98% reliability. With amateur requirements (much less S/N needed and narrower bandwidth) the equipment needed should be much less that what we used.

The setup consisted of two 1 Kw transmitters, each going to it's own 2m dish. One was horizontally polarized, the other vertical, for polarity diversity, since fading is less likely to occur in both planes at the same time. On the receive side there were four receivers and a voting system. Two receivers were on the upper dish (about 110'), with one vertical and one horizontal, the other two receivers were on the lower dish (at about 40'), also with one vertical and one horizontally polarized. Giving space diversity and polarity diversity. Our receive signal at the input to the preamps was typically about -90 dBm and normally in the -80 to -100 dBm range, but with ducting it could get up to -20 dBm, or fading could drop it down to -120 dBm. Fast fading had a period of anywhere from 0.5 to 10 seconds with a 10-20 dB variation in the signal, slow fading occurred over hours or days.

--GaryM
--
Gary Morris KK6YB Internet: garym@alsys.com
San Diego, CA USA Phone: +1 619-457-2700 x128 (work)

112. radio and meteor shower

Newsgroup: rec.radio.amateur.space
Date: 1993-08-11 19:35:10 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <24bhleINNdq1@newsstand.cit.cornell.edu>
Source record: 28822

Well I'd hoped to retire to a dark quiet spot and watch the perseids shower tonight, but the local weather is looking like it will rule that out, so the next thing to try is bouncing radio waves off them. I've got good capability on 2 meters and 70 cm, and gather that there will be a fair bit of activity on 2 (does 70 cm work well for MS?) - I'm presuming all the phone activity will gather around 144.2, and I've heard reports of people planning on trying FM on 146.52. What about packet? I saw a posting someplace about a group trying to do some packet MS work, but no frequencies to monitor were mentioned. Anybody have that data? Any other good freqs or modes to try? Anything happen on 10 fm with meteors?

Thanks in advance for any info.
73 de Kevin, WB2EMS (fkf1@cornell.edu)

113. * SpaceNews 16-Aug-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-08-13 17:37:29 UTC
From: magliaco@pilot.njin.net
Message-ID: <$spc0816@ampr.org>
Source record: 28823
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC0816
* SpaceNews 16-Aug-93 *

BID: $SPC0816

=========
SpaceNews
=========

MONDAY AUGUST 16, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* NASA NEWS *
=============
Space Shuttle Discovery's main engines shut off during the last seconds of countdown this morning to scrub the launch of the STS-51 mission. This was Discovery's third launch attempt.

NASA managers are continuing to evaluate the data to determine what caused the onboard computers to halt the launch. At present, there is no word as to how long the mission will be delayed.

Preparations for the upcoming STS-61 mission are continuing on schedule as some flight hardware arrived at the Kennedy Space Center. Some of this flight hardware will hold the Hubble replacement components inside Endeavour's payload bay during the mission.

The Hubble servicing mission is scheduled for launch in December. Mission duration is targeted for 11 days with five spacewalks planned. The seven member crew's mission objective is to service the space telescope.

[Info via NASA]

* MARS OBSERVER NEWS *
======================
On Monday, July 26th, NASA's Mars Observer spacecraft turned on its camera for a first peek at the Red Planet. Mars Observer is the first American probe to go to Mars since the Vikings did so in the mid-1970's. The spacecraft is still several weeks from its arrival date, August 24th, but even from a distance of 6,000,000 km the camera will still be able to resolve 300 picture elements ("pixels") across the planet's half-lit crescent. Details will actually exceed those of the best Earth-based images, about 23 km per pixel. The Jet Propulsion

Laboratory plans to make one of the images available for publication in early August.

* MICROSAT FROM CHILE *
==========
The first Microsat of Chile, named CEsar-1, will be launched the first months of 1995, according to an announcement made by the Radio Club Federation in Santiago, who will control the satellite when it is in orbit. The satellite will be a Microsat class and will orbit at an altitide of 900 km. The Radio Club Federation said that CEsar-1 will help the comunication between local radio amateurs and the rest of the world.

[Info via Gustavo, LW2DTZ, AMSAT LU Vice President]

* V59 LAUNCH RE-SCHEDULED *
==========
Arianespace V59, which will carry SPOT-3, along with KITSAT-B, PoSAT-A, ITAMSAT-A and EYESAT-A as secondary payloads has been rescheduled for launch 21 September. The SPOT-3 launch campaign has been suspended and will resume at J-21 on the 27th of August. ("J minus 21" is what would be called "T minus 21 days" on a NASA launch, indicating 21 working days to launch.)

Apart from SPOT-3, there are SIX other payloads:-

Stella: German geodetic satellite (like LAGEOS)
HealthSat: Commercial satellite based on UoSat bus.
PoSat: Commercial satellite based on UoSat bus, has amateur compoment.
Itamsat: Amateur satellite based on Microsat bus.
KitSat-B: Amateur satellite based on UoSat bus.
Eyesat-A: Commercial Microsat (also has amateur component called AMRAD).

The ejection sequence has SPOT-3 separated at T+1036 (1036 seconds after launch); Stella at T+1252; Kitsat, Posat, Healthsat at T+1376; Eyesat, Itamsat just after Kitsat/Posat/Healthsat (typically about one second later). There is no information whether the separation springs have different forces so the satellites will separate and not collide. Suggested OSCAR numbers (in order of ejection and alphabetical order): KO-25, PO-26, AO-27, IO-28.

[Info via Jeff Ward, G0SUL/K8KA, and Richard, G3RWL]

* OSCAR NEWS BRIEFS *
==========
WEBERSAT: Mondays will be "spectrometer day" starting soon.

RS-14/OSCAR-21: will continue the digital voice and FM repeater operations. Tests have been conducted with 9600 bps data and more digital operation at this speed is expected (but the AMSAT-DL guys are VERY busy with P3D). AMSAT-DL expect to experiment soon with FAX and SSTV images. The parent GEOS payload is switched off now and Russian FEES have been PAID for, to keep AO-21 operational until at least December 1994.

ARSENE: 2m operations are thought to be VERY unlikely. Enough nitrogen remains for one attitude correction activity per year for five years.

UoSATs: G0SUL will be resuming work on Pacsat-protocol operations at about the time of the SPOT-3 launch and new features (including separate directories for BBS traffic) can be expected to appear shortly afterwards. Uploads will be done by means of UI packets enabling software to combine the features of PB and PG. Apparently one of Jeff's limitations is that KISS software does not allow flow-control on the link between the PC and the TNC.

[Info via Richard, G3RWL]

* OSCAR-13 NEWS *
==========
To mode-S users; the beacon is on for the first MA of each mode-S session MA 30-31, in addition to the regular MA 55-60. This is to allow direct measurement of squint angle to improve our attitude estimate.

10 watts to a 16 turn helix (400 w eirp) is more than adequate for mode-S SSB. A few daily stations using at least 150 watts to big antennas are making it almost impossible for newcomers to experiment. Give 'em a chance please?

Magnetorquing from attitude 150/0 to 180/0 will commence on Aug 14 [Sat] 1407 UTC, orbit 3957/224, and continue for 5 perigees. Estimated interim attitudes will be Orbit Alon/Alat: 3958 153/1 3959 159/-1 3960 165/-3 3961 172/-4 3962 178/-5. For command purposes during this 3-day period mode-S beacon is ON MA 55-60 and MA 145-150, i.e. mode-B OFF. The new schedule will be uploaded on orbit 3961 at MA 145. Mode BS will initially be MA 150-180 only.

[Info via James, G3RUH]

* SpaceNews VIA INTERNET *
==========
Those wishing to access SpaceNews off the Internet are reminded they may do so by using the "finger" command:

finger magliaco@pilot.njin.net.

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

IW4BKW N5RHI N8MLU TG9SO

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
UUCP : ...catfish.ocpt.ccur.com!ka2qhd!kd2bd
PACKET : KD2BD @ NN2Z.NJ.USA.NA

INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX
--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

114. Help needed on legal questions

Newsgroup: rec.radio.amateur.space
Date: 1993-08-14 11:17:02 UTC
From: zvikal@ccsg.tau.ac.il
Message-ID: <1993Aug14.111702.14026@aristo.tau.ac.il>
Source record: 28824

A question that is intriguing me:
In the U.S., does one need a license in order to operate a radio station that only listens to broadcasts? Is a license necessary in order to build such equipment or buy it?
Consider the story from a few years back of th USSR embassy buying a piece of land very close to the sattelite receiving station that the NSA operates where the Keyhole reconnisance sattelites' imagery is received and processed. A further extension of this idea (with possibly more complex legal sides to it): If one puts a small sat dish near a legally operated SPOT reception station, and thus gets all the pictures this station has paid for, is that legal?
Taken to the extreme, If I put a dish in my yard that receives A cable TV broadcast, is that also illegal?

If you want to reply directly to me, my email is zvikal@ccsg.tau.ac.il

Thanks,
Zvi Lev

115. Re: Help needed on legal questions

Newsgroup: rec.radio.amateur.space
Date: 1993-08-14 19:20:48 UTC
From: oppedahl@panix.com
Message-ID: <24jdug$5ag@panix.com>
Source record: 28826

In <1993Aug14.111702.14026@aristo.tau.ac.il> zvikal@ccsg.tau.ac.il (Zvi Lev) writes:

>In the U.S., does one need a license in order to operate a radio
>station that only listens to broadcasts?

Generally, no. But some categories of listening are forbidden --
listening to cellular phone calls, using a radar detector in a
state where it is illegal, listening to police calls on a scanner
in a car in states where that is forbidden ... or unscrambling a
video satellite signal that was encrypted ...

>Is a license necessary in
>order to build such equipment or buy it?

>Consider the story from a few years back of th USSR embassy buying
> a piece of land very close to the sattelite receiving station that
>the NSA operates where the Keyhole reconnisance sattelites' imagery is
>received and processed. A further extension of this idea (with
>possibly more complex legal sides to it): If one puts a small sat
>dish near a legally operated SPOT reception station, and thus gets
>all the pictures this station has paid for, is that legal?

If it is encrypted and you decrypt it, no it might not be legal.
If it is not encrypted you could receive it but could not
copy it or otherwise distribute it.

>Taken to the extreme, If I put a dish in my yard that receives A cable
>TV broadcast, is that also illegal?

NONE OF THIS IS LEGAL ADVICE. SEE A LAWYER FOR ADVICE SPECIFIC TO YOUR
SITUATION IF YOU ACTUALLY CARE ABOUT THIS.

--
Carl Oppedahl AA2KW (patent lawyer)
1992 Commerce Street #309
Yorktown Heights, NY 10598-4412
voice 212-777-1330

116. SPACE TRIVIA LIST UPDATE - 14th August, 1992

Newsgroup: rec.radio.amateur.space
Date: 1993-08-14 19:21:10 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Aug14.192110.330@scorch.apana.org.au>
Source record: 28825
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

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*****************************************************************************
*****************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
*****************************************************************************
```

(174) The current shuttle flight computers are Quad redundant with a fifth
computer as a backup. They are AP-101S machines and were designed in
the mid 80's. Relatives of this computer also fly on the B-1, F-8,
AC-130 and B-52.
[Wingert@vnet.IBM.COM (Bret Wingert)]

(175) "every passing year brings the Solar System forty-three thousand
miles closer to Globular Cluster M13 in Hercules-- and still there
are some misfits who insist that there is no such thing
as progress." RANSOM K. FERN
[From burt@techbook.com (Burt Keeble)]
(This was posted with a smiley, so we'd like some more info

on this one if anyone has any...)

(176) Here's another bit of trivia for you: Neil Armstrong and
David Scott were in rather of a pickle during their Gemini 8 mission
when a thruster continued firing after instructed to stop, putting
the spacecraft in a spin. I believe the mission was then curtailed
because of the lack of adequate thruster propellant for on-orbit
maneuvering and re-entry positioning. Evidently American television
audiences complained at the news reports interrupting the show they
were watching with news of this real-life space drama.
The show? Star Trek.
[From quagga@trystero.com]

(177) The top age set for the intake of the new group of astronauts for
the selection of the original Mercury Seven astronauts was set
at 40. The maximum height was set at 5ft, 11in and the weight
limit was 180lb.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(178) The first check of Military Test Pilot records revealed that 508
test pilots met the basic astronaut requirements. With suggestions
from commanding officers, this was reduced to 110. Further, with
the help of trainers and instructors, who'd brought these men up
to flight status, this was further reduced to 69. These people were
all invited to apply, but only 32 volunteered. These all went on
to undergo physical examinations and were reduced to 14. The selection
of the final 7 came at 2PM, April 9, 1959.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(179) John Glenn was the only Mercury astronaut with Red Hair, all the
others had brown hair.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(180) Alan Shepard was the tallest Mercury Astronaut at 5ft 11in, and
Gus Grissom the shortest at 5ft 7in.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(181) Gordon Cooper was the Youngest Mercury astronaut at 32 years of
age at selection, and John Glenn the oldest at 37.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(182) Alan Shepard was particular fond of Jos(233) Jim(233)nez, the brainchild of
comedian Bill Dana. Al found Jim(233)nez brand of humour such a handy
device for relaxing the troops when tension was building up before a
flight that he once arranged for a tape of some of Jos(233)'s dialogue
to be played in the Mercury control centre during a practice run.
[We Seven - by the Astronauts Themselves, Simon and Schuster,

New York, 1962.]

(183) Alan Shepard was so fond of his white Corvette sports car that he would often drive the 800miles from his home town to Cape Canaveral rather than fly.
[We Seven - by the Astronauts Themselves, Simon and Schuster, New York, 1962.]

(184) Milt Thompson is the person who came closest to flying in space without actually doing so: he is the only person ever to have flown into the mesosphere (above the stratopause at about 50 km) without making it above the 80 km limit that is becoming the accepted boundary of space by space historians.
[Jonathon's Space Report, No. 164, August 11, 1993]

(185) Wally Schirra came back to the US with stories of the good humour of the Australians when he returned from a tour of duty at the Mercury tracking station. Somebody had said 'Site status green, flight control is Extra Grouse' using the term Extra Grouse to replace O.K.
[We Seven - by the Astronauts Themselves, Simon and Schuster, New York, 1962. Had to include this one for my fellow Australians....]

(186) A small controversy erupted from the Apollo 8 and 10 flight crews who went to the moon but never actually landed. Apollo 8 reported that the Moon was gray, while Apollo 10 claimed it was Brown.
[LIFTOFF - By Michael Collins.]

(187) The area picked out for the landing of Apollo 11 was expected to be smooth - but instead it was littered with boulders the size of Volkswagons.
[LIFTOFF - By Michael Collins.]

(188) The albedo of the Earth is some 4 times greater than that of the Moon.
[LIFTOFF - By Michael Collins.]

(189) Mike Collins bet Neil Armstrong a beer that they would land in the Ocean a splash upside-down once they hit the water. The astronauts were required to throw a breaker that released the parachutes, but at the moment of splash down their hands are kerked away, and the craft slowly turned over.
[LIFTOFF - By Michael Collins.]

****
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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!

The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(8) One of my favorite stories (though you should probably check out the
veracity of it) is in regards to the Apollo program. Several of the
early launches were on Little Joe II rockets, which were solid fuel
boosters, and were designed mainly to test the escape tower system.
The Little Joe II rocket was described by one NASA official as being
"the most reliable booster we've ever built". On the last such flight,
the fuel charge in the Little Joe II shattered several seconds before
the scheduled test of the escape tower, creating a true emergency for
the escape tower to handle (the escape tower worked perfectly). The
Little Joe II launches, by the way, took place at White Sands Missle
range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(9) Is there any truth to the rumor that Dick Nixon ordered all plans for
the Saturn V destroyed so that they wouldn't fall into the hands of
the Soviets?
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(10) At one time, the Gemini space craft was going to land on land rather
than on water, with a rather bizzare inflatible "hang-glider" instead
of parachutes. (I remember having a NASA publication when I was a
kid that had drawings of this configuration. It even showed the
storage compartment for the inflatible wing running between the two
hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
(Can anyone come up with some sources for backing up/refuting the last
three items?)

****

(255)

117. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-08-15 11:00:24 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-745412421@unomaha.edu>
Source record: 28827
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

```
Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
```

arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
==========

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

118. ARLK032 Keplerian data

Newsgroup: rec.radio.amateur.space
Date: 1993-08-16 23:11:12 UTC
From: marcbg@feenix.metronet.com
Message-ID: <$arlk032@ampr.org>
Source record: 28828
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEP @ ARL $ARLK032
ARLK032 Keplerian data

ZCZC SK44
QST de W1AW
Keplerian Bulletin 32 ARLK032
>From ARRL Headquarters
Newington, CT August 15, 1993
To all radio amateurs

SB KEP ARL ARLK032
ARLK032 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

AO-10
1 14129U 83058 B 93221.06889999 -.00000019 99999-4 0 154
2 14129 27.0868 11.8398 6022186 104.2478 326.2403 2.05882066 48381
RS-10/11
1 18129U 87054 A 93220.43284199 0.00000088 89554-4 0 6381
2 18129 82.9203 199.9896 0011538 165.4463 194.6995 13.72321524307019
UO-11
1 14781U 84021 B 93215.16055773 0.00000214 40399-4 0 4271
2 14781 97.8101 239.4802 0010858 202.8016 157.2703 14.69034577503614
RS-12/13
1 21089U 91007 A 93219.09473796 0.00000019 13296-4 0 4120
2 21089 82.9222 244.3622 0027716 264.3337 95.4657 13.74025097125519
AO-13
1 19216U 88051 B 93217.59545340 0.00000151 20473-2 0 6281
2 19216 57.8256 301.8379 7222206 321.1899 4.8410 2.09717933 7891
UO-14
1 20437U 90005 B 93218.73957688 0.00000038 22824-4 0 7604
2 20437 98.6130 302.4541 0011877 37.2541 322.9463 14.29785557184656
AO-16
1 20439U 90005 D 93218.73756346 0.00000033 20735-4 0 5651
2 20439 98.6207 303.3807 0012226 38.3084 321.8965 14.29844227184667
DO-17
1 20440U 90005 E 93218.79218351 0.00000031 20010-4 0 5674
2 20440 98.6211 303.6596 0012298 37.9561 322.2477 14.29980426184683
```

```
WO-18
1 20441U 90005 F 93219.25219564 0.00000031 19859-4 0 5695
2 20441 98.6209 304.1374 0012876 36.3969 323.8080 14.29959852184752
LO-19
1 20442U 90005 G 93219.25085967 0.00000038 22703-4 0 5660
2 20442 98.6211 304.3215 0013238 35.7691 324.4369 14.30050311184762
FO-20
1 20480U 90013 C 93213.62679476 -.00000013 15582-6 0 4527
2 20480 99.0320 61.1953 0541077 343.7838 14.6522 12.83220426163149
AO-21
1 21087U 91006 A 93222.78919451 0.00000084 82656-4 0 8245
2 21087 82.9432 12.4120 0034219 228.0928 131.7291 13.74523258126944
UO-22
1 21575U 91050 B 93219.08053576 0.00000062 27770-4 0 2653
2 21575 98.4703 294.3668 0007975 140.7748 219.4029 14.36842996107973
KO-23
1 22077U 92052 B 93220.36901674 0.00000000 99999-4 0 1101
2 22077 66.0839 214.9336 0001040 164.0942 196.0109 12.86279781 46558
Mir
1 16609U 86017 A 93223.12589245 0.00007296 94354-4 0 2310
2 16609 51.6212 303.5868 0004074 325.5769 34.4921 15.59173182427701

Keplerian bulletins are transmitted twice weekly from W1AW.
The next scheduled transmission of these data will be Tuesday,
August 17, 1993, at 2230z on Baudot, AMTOR and ASCII.
NNNN
/EX

--
Marc B. Grant, N5MEI | marcbg@feenix.metronet.com | 214/231-3998 (voice)
P.O Box 850472 | marcbg@esy.com | 214/231-0025 (fax)
Richardson, TX 75085 | |
```

119. * SpaceNews 23-Aug-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-08-20 20:04:45 UTC
From: magliaco@pilot.njin.net
Message-ID: <$spc0823@ampr.org>
Source record: 28838
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB NEWS @ AMSAT $SPC0823
* SpaceNews 23-Aug-93 *

BID: $SPC0823

=========
SpaceNews
=========

MONDAY AUGUST 23, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* NASA NEWS *
=============
Presently workers at the Kennedy Space Center are continuing to prepare Space Shuttle Endeavour for the STS-61 mission. They plan to install the 5th cryogenic tank set and perform main propulsion system leak and functional checks. Completed work on the orbiter includes ammonia boiler checks and orbital maneuvering system functional checks.

On Monday, August 30, 1993 and continuing through September 1, the Johnson Space Center will host a workshop for news media. The workshop will familiarize reporters with the training and operations leading up to the first servicing mission of the Hubble Space Telescope. The STS-61 mission is slated to launch in early December.

The 3 day workshop will include briefings on mission preparation and round-robin interviews with the 7-member crew. The mission preparation and overview briefings will be carried on NASA TV.

Hubble's servicing mission is scheduled to last 11 days and include several space walks. The mission will conclude with a landing at the Kennedy Space Center.

[Info via NASA]

* POSAT-1 NEWS *
================
POSAT-1 -- POSSIBLE OPPORTUNITIES FOR AMATEUR EXPERIMENTATION

PoSAT-1 was built at the University of Surrey by SSTL staff and a team of 4 engineers seconded from Portugese industry. PoSAT-1 has been built as a technology-transfer project between SSTL and a consortium of Portugese aerospace companies. The satellite carries an Earth imaging camera, a CCD Star sensor, a Trimble GPS receiver and a digital signal processing

experiment with TMS320C25 and TMS320C30 processors. Of course, the standard on-board computer supporting standard PACSAT protocols is also provided.

Surrey is negotiating with the Portugese industrial consortium for PoSAT to operate in the amateur bands part time (its primary mission is outside the amateur bands). Part time amateur access would allow standard UoSAT-OSCAR-22 equipped stations to receive pictures from the camera and data from the GPS experiment. It is also possible to provide high speed modulation through the DSP system, which will allow radio amateurs to develop the necessary RF and digital techniques to go beyond 9600 bits/second.

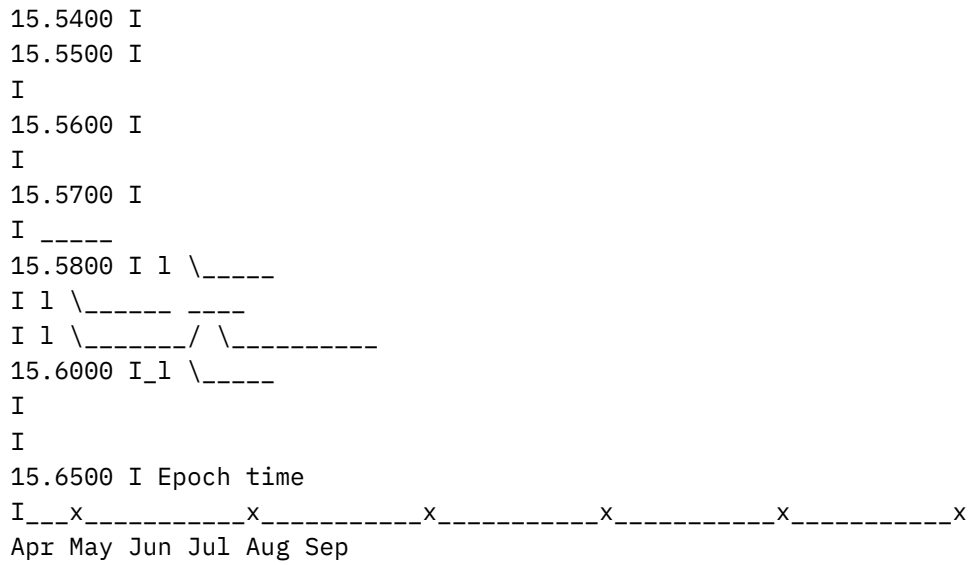
The PoSAT camera has the same optics as the KITSAT-A camera, but since PoSAT is twice as close to the Earth as KITSAT, resolution will be doubled. The narrow-angle camera should produce 200 meter resolution! Standard PACSAT Broadcast Protocol techniques will be used to download the images.

[Info via Jeff Ward, K8KA/G0SUL at the University of Surrey UoSAT Unit]

* MIR NEWS *
============
The following graph by Jean-Claude, FB1RCI depicts Mir's orbital mean motion (the number of perigee crossings per day) as a function of time. Keep in mind that mean motion is a function of altitude. The greater the satellite's altitude, the lower the mean motion.

Time revolution summary for the MIR Complex object 16609
(Period= day 79 to day 216 1993)

rev/day



Orbit adjustments were performed on March 22, and June 17 during this study.

[Info via Jean-Claude, FB1RCI]

* PERSEIDS REPORT *
====================

The following group of HAMS from Maryland travelled up to SKYLINE DRIVE to observe the Perseids on Aug 11-12. They stopped at BIG MEADOWS (mile 51) on the drive and saw a great show! It was an average year as far as number of meteors, running about 40 or so an hour from 9 PM (11th) until 1:30 on the 12th. Skies were clear with excellent viewing conditions. There were a large number of very bright meteors this year, over 36 that went halfway across the sky and left very large smoke trails. The large number of "bright meteors" has led some to believe that we missed the core of the stream and went through the edge of the stream where we encountered a number of large fragments that had not been reduced to smaller dust type meteors, i.e. lack of collisions with their neighbors in the stream. The hams on hand were: WA3TAI, WA3ZII, N3OZM, KA3ZPA, KB3AGF and N3CAM, all members of the Southern Maryland Amateur Radio Club.

[Info via Larry, N3CAM]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:
7Z2YB K6DGW

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
UUCP : ...catfish.ocpt.ccur.com!ka2qhd!kd2bd
PACKET : KD2BD @ NN2Z.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

120. ORBS$233.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-08-21 04:58:31 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-233.o@ampr.org>
Source record: 28840
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-233.O
Orbital Elements 233.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX August 21, 1993
BID: $ORBS-233.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93231.75179754
Element set: 21
Inclination: 27.0569 deg
RA of node: 10.1473 deg
Eccentricity: 0.6021794
Arg of perigee: 107.1044 deg
Mean anomaly: 324.1194 deg
Mean motion: 2.05882262 rev/day
Decay rate: -6.5e-07 rev/day^2
Epoch rev: 7657
Checksum: 282

Satellite: UO-11
Catalog number: 14781
Epoch time: 93223.60658007
Element set: 428
Inclination: 97.8094 deg
RA of node: 247.5503 deg
Eccentricity: 0.0011577
Arg of perigee: 173.9570 deg
Mean anomaly: 186.1778 deg
Mean motion: 14.69038330 rev/day
Decay rate: 1.98e-06 rev/day^2
Epoch rev: 50485
Checksum: 329

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93229.83827171
Element set: 640
Inclination: 82.9234 deg
RA of node: 193.0392 deg
Eccentricity: 0.0012481
Arg of perigee: 139.9196 deg
```

Mean anomaly: 220.2871 deg
Mean motion: 13.72321881 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 30830
Checksum: 304

Satellite: AO-13
Catalog number: 19216
Epoch time: 93226.17818333
Element set: 632
Inclination: 57.8443 deg
RA of node: 300.3381 deg
Eccentricity: 0.7221606
Arg of perigee: 321.8002 deg
Mean anomaly: 4.7665 deg
Mean motion: 2.09725131 rev/day
Decay rate: -1.04e-06 rev/day^2
Epoch rev: 3957
Checksum: 277

Satellite: FO-20
Catalog number: 20480
Epoch time: 93225.78913214
Element set: 453
Inclination: 99.0306 deg
RA of node: 71.0468 deg
Eccentricity: 0.0540659
Arg of perigee: 316.2348 deg
Mean anomaly: 39.7057 deg
Mean motion: 12.83220466 rev/day
Decay rate: -1.4e-07 rev/day^2
Epoch rev: 16470
Checksum: 293

Satellite: AO-21
Catalog number: 21087
Epoch time: 93231.81561965
Element set: 829
Inclination: 82.9426 deg
RA of node: 5.7317 deg
Eccentricity: 0.0034611
Arg of perigee: 202.3434 deg
Mean anomaly: 157.6192 deg
Mean motion: 13.74523755 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 12818
Checksum: 302

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93229.07106723

Element set: 413
Inclination: 82.9219 deg
RA of node: 236.9625 deg
Eccentricity: 0.0027660
Arg of perigee: 234.9376 deg
Mean anomaly: 124.9185 deg
Mean motion: 13.74025364 rev/day
Decay rate: 1.7e-07 rev/day^2
Epoch rev: 12688
Checksum: 314

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93220.71127607
Element set: 19
Inclination: 1.1442 deg
RA of node: 124.5650 deg
Eccentricity: 0.2935408
Arg of perigee: 146.5525 deg
Mean anomaly: 234.2699 deg
Mean motion: 1.42202880 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 132
Checksum: 262

/EX
SB KEPS @ AMSAT $ORBS-233.D
Orbital Elements 233.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX August 21, 1993
BID: $ORBS-233.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93231.26605416
Element set: 762
Inclination: 98.6123 deg
RA of node: 314.8397 deg
Eccentricity: 0.0011366
Arg of perigee: 2.8372 deg
Mean anomaly: 357.2872 deg
Mean motion: 14.29787542 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 18644
Checksum: 315

Satellite: AO-16
Catalog number: 20439
Epoch time: 93231.26352572
Element set: 567

Inclination: 98.6190 deg
RA of node: 315.7747 deg
Eccentricity: 0.0011719
Arg of perigee: 3.1468 deg
Mean anomaly: 356.9786 deg
Mean motion: 14.29846065 rev/day
Decay rate: 3.5e-07 rev/day^2
Epoch rev: 18645
Checksum: 333

Satellite: DO-17
Catalog number: 20440
Epoch time: 93231.24698108
Element set: 569
Inclination: 98.6203 deg
RA of node: 315.9886 deg
Eccentricity: 0.0011881
Arg of perigee: 2.7769 deg
Mean anomaly: 357.3478 deg
Mean motion: 14.29982418 rev/day
Decay rate: 4.0e-07 rev/day^2
Epoch rev: 18646
Checksum: 337

Satellite: WO-18
Catalog number: 20441
Epoch time: 93231.70717307
Element set: 571
Inclination: 98.6201 deg
RA of node: 316.4658 deg
Eccentricity: 0.0012362
Arg of perigee: 1.8628 deg
Mean anomaly: 358.2599 deg
Mean motion: 14.29961627 rev/day
Decay rate: 3.6e-07 rev/day^2
Epoch rev: 18653
Checksum: 312

Satellite: LO-19
Catalog number: 20442
Epoch time: 93231.70504863
Element set: 568
Inclination: 98.6204 deg
RA of node: 316.6519 deg
Eccentricity: 0.0012713
Arg of perigee: 1.0517 deg
Mean anomaly: 359.0693 deg
Mean motion: 14.30052236 rev/day
Decay rate: 4.0e-07 rev/day^2
Epoch rev: 18654
Checksum: 280

Satellite: UO-22
Catalog number: 21575
Epoch time: 93231.75449411
Element set: 267
Inclination: 98.4693 deg
RA of node: 306.8326 deg
Eccentricity: 0.0008484
Arg of perigee: 106.0767 deg
Mean anomaly: 254.1336 deg
Mean motion: 14.36845142 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 10979
Checksum: 315

Satellite: KO-23
Catalog number: 22077
Epoch time: 93231.33196579
Element set: 111
Inclination: 66.0824 deg
RA of node: 191.9814 deg
Eccentricity: 0.0000444
Arg of perigee: 137.4733 deg
Mean anomaly: 222.6319 deg
Mean motion: 12.86279631 rev/day
Decay rate: -.00000000 rev/day^2
Epoch rev: 4796
Checksum: 286

/EX
SB KEPS @ AMSAT $ORBS-233.W
Orbital Elements 233.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX August 21, 1993
BID: $ORBS-233.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93231.78366715
Element set: 441
Inclination: 99.0967 deg
RA of node: 273.0498 deg
Eccentricity: 0.0015292
Arg of perigee: 352.8514 deg
Mean anomaly: 7.2451 deg
Mean motion: 14.13539534 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 44776
Checksum: 332

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93231.76299227
Element set: 283
Inclination: 98.5142 deg
RA of node: 244.8897 deg
Eccentricity: 0.0013905
Arg of perigee: 126.3373 deg
Mean anomaly: 233.9093 deg
Mean motion: 14.24828078 rev/day
Decay rate: 7.0e-07 rev/day^2
Epoch rev: 35968
Checksum: 343

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93232.28298461
Element set: 879
Inclination: 82.5464 deg
RA of node: 147.9442 deg
Eccentricity: 0.0016147
Arg of perigee: 312.2366 deg
Mean anomaly: 47.7421 deg
Mean motion: 13.84691111 rev/day
Decay rate: 5.3e-07 rev/day^2
Epoch rev: 28071
Checksum: 311

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93232.23669589
Element set: 53
Inclination: 82.5426 deg
RA of node: 176.6306 deg
Eccentricity: 0.0016008
Arg of perigee: 298.8112 deg
Mean anomaly: 61.1449 deg
Mean motion: 13.16960545 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 24364
Checksum: 306

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93231.83247056
Element set: 192
Inclination: 99.1371 deg
RA of node: 208.9043 deg
Eccentricity: 0.0010875
Arg of perigee: 261.3666 deg
Mean anomaly: 98.6298 deg
Mean motion: 14.12907284 rev/day
Decay rate: 1.17e-06 rev/day^2

Epoch rev: 25266
Checksum: 313

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93231.97362886
Element set: 817
Inclination: 82.5176 deg
RA of node: 24.0587 deg
Eccentricity: 0.0014436
Arg of perigee: 357.8314 deg
Mean anomaly: 2.2781 deg
Mean motion: 13.84341635 rev/day
Decay rate: 2.6e-07 rev/day^2
Epoch rev: 22601
Checksum: 310

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93232.20619064
Element set: 726
Inclination: 82.5531 deg
RA of node: 119.7202 deg
Eccentricity: 0.0016132
Arg of perigee: 321.9262 deg
Mean anomaly: 38.0719 deg
Mean motion: 13.16022429 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18352
Checksum: 257

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93232.09090408
Element set: 569
Inclination: 82.5462 deg
RA of node: 87.6397 deg
Eccentricity: 0.0014684
Arg of perigee: 275.8136 deg
Mean anomaly: 84.1357 deg
Mean motion: 13.84178452 rev/day
Decay rate: -5.0e-08 rev/day^2
Epoch rev: 15896
Checksum: 336

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93229.94982459
Element set: 615
Inclination: 98.8591 deg
RA of node: 254.4701 deg

Eccentricity: 0.0016811
Arg of perigee: 133.3562 deg
Mean anomaly: 226.9008 deg
Mean motion: 14.01294476 rev/day
Decay rate: -1.84e-06 rev/day^2
Epoch rev: 15123
Checksum: 319

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93230.95013143
Element set: 573
Inclination: 82.5225 deg
RA of node: 26.4432 deg
Eccentricity: 0.0012759
Arg of perigee: 168.8617 deg
Mean anomaly: 191.2828 deg
Mean motion: 13.83556036 rev/day
Decay rate: 3.2e-07 rev/day^2
Epoch rev: 14596
Checksum: 298

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93230.45642473
Element set: 392
Inclination: 82.5430 deg
RA of node: 23.6121 deg
Eccentricity: 0.0012675
Arg of perigee: 218.6024 deg
Mean anomaly: 141.4231 deg
Mean motion: 13.16451645 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11152
Checksum: 244

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93231.76315203
Element set: 649
Inclination: 98.6545 deg
RA of node: 260.6933 deg
Eccentricity: 0.0013797
Arg of perigee: 33.2603 deg
Mean anomaly: 326.9449 deg
Mean motion: 14.22300920 rev/day
Decay rate: 1.77e-06 rev/day^2
Epoch rev: 11768
Checksum: 299

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93230.27606428
Element set: 449
Inclination: 82.5514 deg
RA of node: 330.6565 deg
Eccentricity: 0.0012248
Arg of perigee: 238.6146 deg
Mean anomaly: 121.3757 deg
Mean motion: 13.16822784 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9659
Checksum: 311

Satellite: NOAA-13
Catalog number: 22739
Epoch time: 93230.54120631
Element set: 16
Inclination: 98.9098 deg
RA of node: 171.7273 deg
Eccentricity: 0.0008895
Arg of perigee: 253.5930 deg
Mean anomaly: 106.4339 deg
Mean motion: 14.10846522 rev/day
Decay rate: -4.71e-06 rev/day^2
Epoch rev: 128
Checksum: 294

/EX
SB KEPS @ AMSAT $ORBS-233.M
Orbital Elements 233.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX August 21, 1993
BID: $ORBS-233.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93231.45771588
Element set: 246
Inclination: 51.6185 deg
RA of node: 261.7152 deg
Eccentricity: 0.0004581
Arg of perigee: 1.4840 deg
Mean anomaly: 358.5862 deg
Mean motion: 15.59314826 rev/day
Decay rate: 7.206e-05 rev/day^2
Epoch rev: 42900
Checksum: 301

Satellite: HUBBLE
Catalog number: 20580

Epoch time: 93231.87227138
Element set: 161
Inclination: 28.4699 deg
RA of node: 13.8024 deg
Eccentricity: 0.0004471
Arg of perigee: 356.3637 deg
Mean anomaly: 3.6989 deg
Mean motion: 14.92800568 rev/day
Decay rate: 7.44e-06 rev/day^2
Epoch rev: 18104
Checksum: 300

Satellite: GRO
Catalog number: 21225
Epoch time: 93231.25637020
Element set: 966
Inclination: 28.4699 deg
RA of node: 196.4467 deg
Eccentricity: 0.0009011
Arg of perigee: 305.5310 deg
Mean anomaly: 54.4465 deg
Mean motion: 15.75165832 rev/day
Decay rate: 1.5741e-04 rev/day^2
Epoch rev: 1006
Checksum: 282

Satellite: TUBSAT
Catalog number: 21577
Epoch time: 93231.12993875
Element set: 272
Inclination: 98.4670 deg
RA of node: 305.7444 deg
Eccentricity: 0.0007322
Arg of perigee: 107.6605 deg
Mean anomaly: 252.5385 deg
Mean motion: 14.36389314 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 10967
Checksum: 305

Satellite: SARA
Catalog number: 21578
Epoch time: 93232.23149083
Element set: 441
Inclination: 98.4756 deg
RA of node: 308.7353 deg
Eccentricity: 0.0005836
Arg of perigee: 105.5716 deg
Mean anomaly: 254.6116 deg
Mean motion: 14.38499958 rev/day
Decay rate: 2.93e-06 rev/day^2

Epoch rev: 10993
Checksum: 326

Satellite: UARS
Catalog number: 21701
Epoch time: 93223.65499224
Element set: 253
Inclination: 56.9833 deg
RA of node: 319.1315 deg
Eccentricity: 0.0004184
Arg of perigee: 93.3539 deg
Mean anomaly: 266.8018 deg
Mean motion: 14.96217004 rev/day
Decay rate: -2.546e-05 rev/day^2
Epoch rev: 10460
Checksum: 289

Satellite: FREJA
Catalog number: 22161
Epoch time: 93232.25259642
Element set: 146
Inclination: 62.9981 deg
RA of node: 333.7799 deg
Eccentricity: 0.0772166
Arg of perigee: 288.5116 deg
Mean anomaly: 63.3570 deg
Mean motion: 13.21655334 rev/day
Decay rate: 1.59e-06 rev/day^2
Epoch rev: 4202
Checksum: 302

/EX

121. ORBS$233.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-08-21 05:00:21 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-233.n@ampr.org>
Source record: 28839
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-233.N
2Line Orbital Elements 233.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX August 21, 1993
BID: $ORBS-233.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93231.75179754 -.00000065 00000-0 99999-4 0 211
2 14129 27.0569 10.1473 6021794 107.1044 324.1194 2.05882262 76574
UO-11
1 14781U 84 21 B 93223.60658007 .00000198 00000-0 37632-4 0 4287
2 14781 97.8094 247.5503 0011577 173.9570 186.1778 14.69038330504856
RS-10/11
1 18129U 87 54 A 93229.83827171 .00000088 00000-0 89554-4 0 6401
2 18129 82.9234 193.0392 0012481 139.9196 220.2871 13.72321881308304
AO-13
1 19216U 88 51 B 93226.17818333 -.00000104 00000-0 20752-2 0 6325
2 19216 57.8443 300.3381 7221606 321.8002 4.7665 2.09725131 39572
FO-20
1 20480U 90 13 C 93225.78913214 -.00000014 00000-0 -31207-5 0 4533
2 20480 99.0306 71.0468 0540659 316.2348 39.7057 12.83220466164708
AO-21
1 21087U 91 6 A 93231.81561965 .00000084 00000-0 82656-4 0 8298
2 21087 82.9426 5.7317 0034611 202.3434 157.6192 13.74523755128180
RS-12/13
1 21089U 91 7 A 93229.07106723 .00000017 00000-0 11162-4 0 4132
2 21089 82.9219 236.9625 0027660 234.9376 124.9185 13.74025364126881
ARSENE
1 22654U 93 31 B 93220.71127607 -.00000049 00000-0 99999-4 0 198
2 22654 1.1442 124.5650 2935408 146.5525 234.2699 1.42202880 1323
UO-14
1 20437U 90 5 B 93231.26605416 .00000047 00000-0 25969-4 0 7622
2 20437 98.6123 314.8397 0011366 2.8372 357.2872 14.29787542186447
AO-16
1 20439U 90 5 D 93231.26352572 .00000035 00000-0 21509-4 0 5672
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2 20439 98.6190 315.7747 0011719 3.1468 356.9786 14.29846065186451
DO-17
1 20440U 90 5 E 93231.24698108 .00000040 00000-0 23273-4 0 5698
2 20440 98.6203 315.9886 0011881 2.7769 357.3478 14.29982418186460
WO-18
1 20441U 90 5 F 93231.70717307 .00000036 00000-0 21472-4 0 5710
2 20441 98.6201 316.4658 0012362 1.8628 358.2599 14.29961627186532
LO-19
1 20442U 90 5 G 93231.70504863 .00000040 00000-0 23226-4 0 5682
2 20442 98.6204 316.6519 0012713 1.0517 359.0693 14.30052236186547
UO-22
1 21575U 91 50 B 93231.75449411 .00000051 00000-0 24349-4 0 2678
2 21575 98.4693 306.8326 0008484 106.0767 254.1336 14.36845142109798
KO-23
1 22077U 92 52 B 93231.33196579 -.00000000 00000-0 99999-4 0 1113
2 22077 66.0824 191.9814 0000444 137.4733 222.6319 12.86279631 47965
NOAA-9
1 15427U 84123 A 93231.78366715 .00000099 00000-0 62853-4 0 4416
2 15427 99.0967 273.0498 0015292 352.8514 7.2451 14.13539534447766
NOAA-10
1 16969U 86 73 A 93231.76299227 .00000070 00000-0 38002-4 0 2837
2 16969 98.5142 244.8897 0013905 126.3373 233.9093 14.24828078359681
MET-2/17
1 18820U 88 5 A 93232.28298461 .00000053 00000-0 42440-4 0 8792
2 18820 82.5464 147.9442 0016147 312.2366 47.7421 13.84691111280711
MET-3/2
1 19336U 88 64 A 93232.23669589 .00000043 00000-0 99999-4 0 532
2 19336 82.5426 176.6306 0016008 298.8112 61.1449 13.16960545243640
NOAA-11
1 19531U 88 89 A 93231.83247056 .00000117 00000-0 73529-4 0 1929
2 19531 99.1371 208.9043 0010875 261.3666 98.6298 14.12907284252669
MET-2/18
1 19851U 89 18 A 93231.97362886 .00000026 00000-0 18224-4 0 8175
2 19851 82.5176 24.0587 0014436 357.8314 2.2781 13.84341635226019
MET-3/3
1 20305U 89 86 A 93232.20619064 .00000043 00000-0 99999-4 0 7262
2 20305 82.5531 119.7202 0016132 321.9262 38.0719 13.16022429183523
MET-2/19
1 20670U 90 57 A 93232.09090408 -.00000005 00000-0 -93519-5 0 5697
2 20670 82.5462 87.6397 0014684 275.8136 84.1357 13.84178452158969
FY-1/2
1 20788U 90 81 A 93229.94982459 -.00000184 00000-0 -11051-3 0 6159
2 20788 98.8591 254.4701 0016811 133.3562 226.9008 14.01294476151237
MET-2/20
1 20826U 90 86 A 93230.95013143 .00000032 00000-0 23706-4 0 5739
2 20826 82.5225 26.4432 0012759 168.8617 191.2828 13.83556036145962
MET-3/4
1 21232U 91 30 A 93230.45642473 .00000043 00000-0 99999-4 0 3928
2 21232 82.5430 23.6121 0012675 218.6024 141.4231 13.16451645111525
NOAA-12
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1 21263U 91 32 A 93231.76315203 .00000177 00000-0 88271-4 0 6491
2 21263 98.6545 260.6933 0013797 33.2603 326.9449 14.22300920117689
MET-3/5
1 21655U 91 56 A 93230.27606428 .00000043 00000-0 99999-4 0 4498
2 21655 82.5514 330.6565 0012248 238.6146 121.3757 13.16822784 96598
NOAA-13
1 22739U 93 50 A 93230.54120631 -.00000471 00000-0 -25277-3 0 169
2 22739 98.9098 171.7273 0008895 253.5930 106.4339 14.10846522 1283
MIR
1 16609U 86 17 A 93231.45771588 .00007206 00000-0 92737-4 0 2469
2 16609 51.6185 261.7152 0004581 1.4840 358.5862 15.59314826429005
HUBBLE
1 20580U 90 37 B 93231.87227138 .00000744 00000-0 63073-4 0 1619
2 20580 28.4699 13.8024 0004471 356.3637 3.6989 14.92800568181044
GRO
1 21225U 91 27 B 93231.25637020 .00015741 00000-0 98782-4 0 9664
2 21225 28.4699 196.4467 0009011 305.5310 54.4465 15.75165832 10065
TUBSAT
1 21577U 91 50 D 93231.12993875 .00000041 00000-0 20886-4 0 2726
2 21577 98.4670 305.7444 0007322 107.6605 252.5385 14.36389314109679
SARA
1 21578U 91 50 E 93232.23149083 .00000293 00000-0 10966-3 0 4418
2 21578 98.4756 308.7353 0005836 105.5716 254.6116 14.38499958109937
UARS
1 21701U 91 63 B 93223.65499224 -.00002546 00000-0 -21356-3 0 2532
2 21701 56.9833 319.1315 0004184 93.3539 266.8018 14.96217004104605
FREJA
1 22161U 92 64 A 93232.25259642 .00000159 00000-0 98830-4 0 1468
2 22161 62.9981 333.7799 0772166 288.5116 63.3570 13.21655334 42025
/EX
```

122. ANS-233 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-08-22 18:17:23 UTC
From: cowdin@pogo.DEn.mmc.COM
Message-ID: <$ans-233.01@ampr.org>
Source record: 28841
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-233.01
MORE INFO ABOUT OSCARS

HR AMSAT NEWS SERVICE BULLETIN 233.01 FROM AMSAT HQ
SILVER SPRING, MD AUGUST 21, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-233.01

KITSAT-B: First Independently Built Korean Satellite

AMSAT-NA would like to correct a bulletin a few weeks ago with respect to KITSAT-B. The KITSAT-B satellite was NOT built at the Univeristy of Surrey but at the Korean Advanced Institute of Science and Technology (KAIST). The satellite was built entirely in Korea using an all-Korean team. Members of this team were trained at Surrey and built KITSAT-A (now known as UO-22) at Surrey; however KITSAT-B is a completely Korean effort. This independent effort is considered to be an important phase in the educational "technology transfer" between Surrey and KAIST.

POSAT-1: Possible Opportunities For Amaetur Experimentation

PoSAT-1 was built at Surrey by SSTL staff and a team of 4 engineers seconded from Portugese industry. PoSAT-1 has been built as a technology-transfer project between SSTL and a consortium of Portugese aerospace companies. The satellite carries an Earth imaging camera, a CCD Star sensor, a Trimble GPS receiver and a digital signal processing experiment with TMS320C25 and TMS320C30 processors. The standard on-board computer supporting standard PACSAT protocols will also be provided.

Although its primary mission is outside the amateur bands, Surrey is negotiating with the Portugese industrial consortium for PoSAT to operate in the amateur bands part ot the time. Such part time amateur access would allow standard UoSAT-OSCAR-22 equipped stations to receive pictures from the camera and data from the GPS experiment. It is also possible to provide high speed modulation through the DSP system, which will allow radio amateurs to develop the necessary RF and digital techniques to go beyond 9600 baud.

The PoSAT camera has the same optics as the KITSAT-A camera, but since PoSAT is to be at half of the altitude of KITSAT, resolution should be doubled. The narrow-angle camera should produce 200 meter resolution. Standard PACSAT Broadcast Protocol techniques will be used to download the images. The amateur community will be kept informed as negotiations with the Portugese Consortium continue. Mail from radio amateurs who think they might be interested in receiving PoSAT-1 in the amateur bands would be

appreciated and might help in conducting these discussions. Please send your comments and suggestions to the following address:

Jeff Ward, K8KA/G0SUL
Surrey Satellite Technology
University of Surrey UoSAT Unit
Guildford, Surrey GU2 5XH
England

Or via Internet: k8ka@AMSAT.org

[The AMSAT News Service (ANS) would like to thank Jeff Ward K8KA/G0SUL for the information used in this bulletin.]

/EX
SB SAT @ AMSAT $ANS-233.02
PHASE-3D STATUS REPORT

HR AMSAT NEWS SERVICE BULLETIN 233.02 FROM AMSAT HQ
SILVER SPRING, MD AUGUST 21, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-233.02

WD4FAB Provides Latest Phase-3D Status Report & Request For Assistance

Dick Jansson (WD4FAB) AMSAT-NA VP for Engineering, reports that the assembly of the Engineering Structural Model for Phase 3-D is now nearing completion in Germany. As many of you know, Dick, along with a team from Weber State University, has been working on this critical task for the past month with Dr. Karl Meinzer (DJ4ZC) and Werner Haas (DJ5KQ) of AMSAT-DL. Their goal has been to confirm the form, fit and function of structural designs for the new satellite. Dick says that the effort has been a tremendous learning experience for all. It has also given everyone involved a much clearer vision of where and how we must proceed in the months to come in order to be ready for launch in 1996.

As this stage of the development draws to a successful close, and as a direct result of the process, Dick now foresees that some additional, and immediate, machining expertise for the spacecraft thermal structure will be required beyond that already being expertly provided by our Weber State University people. He's asked that an urgent request be made for some additional help with machining some of the structural parts for the spacecraft.

Anyone with "hands on" machining experience, particularly in the milling and fine finishing of metal parts, and who also has both the spare time and use of facilities to donate to the Phase-3D cause are welcome to volunteer. Anyone who would like to help, or knows of someone who can, please contact Dick Jansson (beginning August 24th) at (407) 644-9008, or fax him at (407) 644-9782.

[The AMSAT News Service (ANS) would like to thank Dick Daniels (W4PUJ) for the information used in this bulletin.]

/EX
SB SAT @ AMSAT $ANS-233.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 233.03 FROM AMSAT HQ
SILVER SPRING, MD AUGUST 21, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-233.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz

Date UTC Mode Phs NCS Alt NCS

28-Aug-93 1830 B 157 WJ9F VE2LVC
11-Sep-93 0730 B 159 VE2LVC W9ODI
18-Sep-93 1515 B 96 N7NQM W5IU

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-233.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 233.04 FROM AMSAT HQ
SILVER SPRING, MD AUGUST 21, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-233.04

Weekly OSCAR Status Reports: 21-AUG-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 14-Oct 25
Mode-B : MA 0 to MA 60 !
Mode-BS : MA 60 to MA 120 !
Mode-S : MA 120 to MA 145 !<- Mode-S transponder; B transponder is OFF
Mode-S : MA 145 to MA 150 !<- Mode-S beacon only
Mode-BS : MA 150 to MA 210 ! Blon/Blat 180/0

Mode-B : MA 210 to MA 256 !
Omnis : MA 170 to MA 15 ! Move to attitude 210/0 25-Oct-1993
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

RS-10: WB2WPA reports excellent results at his QTH with RS-10. He notes that he has worked 12 states and a number of VE provinces in casual operating over the past few weeks. He installed an Advanced Receiver Research (ARR) 10M preamp, and he saw his signals rise to S-9+. Also, WB2WPA has seen good "over-the-horizon" results for about 1 minute before AOS and after LOS recently running 80 watts to a 15 element beam with horizontal polarization. Also, WC9C reports that the RS-10 transponder is working just fine. With the Solar Flux dropping below 100, Mode-A signals even during the day light hours are fairly strong. The transponder activity was very high last week with at least 3 DX stations heard. There was no message on the telemetry beacon this week, and the CW Robot was also working just fine. [WB2WPA & WC9C]

RS-12: GM4IHJ has been copying RS-12 well into the evenings in the UK while it is "sub-horizon" at the terminator over UA0. He notes that it is well worth the time for RS-12 operators to be looking for the satellite long before AOS and long after LOS and even on "out of range" passes to the north. If you can hear the 29.407 MHz beacon the chances are that the satellite transponder will hear your 21.210 - 21.250 MHz uplink. WC9C reports that RS-12 Mode-K transponder is working fine with lots of activity. With 15M dropping off as the solar flux falls, he says that there is alot less interference to the Mode-K uplink passband. At the end of the telemtry frame there was this test message which said: "Test test test RS3X QTH Kaluga" [GM4IHJ/G3IOR & WC9C]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: Operating normally. [WH6I]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

123. APT-Satellites: Report AUG 21, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-23 07:10:37 UTC
From: peter.henne@gmd.de
Message-ID: <1993Aug23.071037.29295@gmd.de>
Source record: 28829
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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Observed at station 50.7 NLat, 7.1 ELon, AUG 21, 1993

NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
NOAA-13: APT 137.62 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

*NEW* NOAA-13 transmits vis-channels 1 and 2. IR-Sensors
shall be activated on AUG 26 according to info from
wxsat-mail-list, so expect to receive the normal
channel 2 (near-IR/vis) and channel 4 (thermal IR) soon.
NOAA-10 is off due to VHF-conflict with NOAA-12.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
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124. SPACE TRIVIA LIST UPDATE - 23rd August 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-23 19:17:01 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Aug23.191701.9054@scorch.apana.org.au>
Source record: 28830
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

You may notice that in this latest update there are quite a few in
relation to the Mercury S[ace Program. This is because I have just complete
a brilliant book, written in 1962 by the astronauts themselves after only
the first four flights. I found this book down deep in our local
University library and am looking forward to see what other ancient
works of trivia magnificence are buried down there.
The book is called We Seven, published by Simon and Schuster,
New York, 1962. I seriously doubt it is available anywhere other than
in a library. Much of the photographic research was done by TIME, and
I think the astronauts were contracted to do this work by them

If you find it lying around somewhere, I HIGHLY recommend it.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

```
*****************************************************************************
*****************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
*****************************************************************************
```

(44) There were several things to mention about Helens Sharman's flight to
the MIR space station on May 18, 1991.:-
(a) Great Britain was the 22nd nation to fly a citizen into space
(b) Helen Sharman was the joint 248th person in space
(c) She was the 15th woman into space
(d) For the first time a nation's first space traveller was a woman.
(e) She was the first non-soviet, non-american woman into space.
(f) One record that was just missed: because the American Space
Shuttle Columbia was delayed from its scheduled launch
date of May 22, the chance to set a new record or 4 women
in space simultaneously was lost. (This was sts-40, which
finally took off on June 5th.)
[BIS Spaceflight, July 1991 - Please see item 233]

(191) One of the early launches of the Space Shuttle (I don't recall the
number) was "scrubbed" because one of the five onboard computers
didn't come up "in sync" with the others. The interesting thing is
that a couple of days later one of the largest solar storms ever
observed occurred (with the resulting aurora borealis being visible
as far south as Dallas, Texas). If it weren't for the computer
"glitch" that prevented the launch, the Shuttle would have had to
make an emergency landing due to the radiation levels from the storm.
[From jones%azterra@sj.ate.slb.com (Clark Jones)]
{Awaiting the finer details for this one.)

(192) Walter Schirra helped start out the Sidewinder missile program at the
Navy Ordnance Station at China Lake, California. He actually got to
fire the first sidewinder missile at a drone target to see what
would happen. Flying an F3D night fighter, right after he let the
Sidewinder loose it went a little haywire and started a loop which
would chase his plane rather than the drone. So he made a fast
loop, trying to stay behind it. It succeeded, but his flight
engineer had a bad case of the 'clanks', which is pilot talk for
the 'shakes.'
[Walter M. Schirra, We Seven, 1962]

(193) The first two Mercury spacecraft carried with them some extra
equipment to help the rescue crews find them in the ocean - a chaff
dispenser and an underwater bomb.
[Donald K. Slayton, We Seven, 1962]

(194) One of the concerns of the Mercury astronauts was to know exactly
what all the noises were as they were preparing from launch. They
could hear absolutely everything, from moving the gantries outside
to hearing the pipes creek as the fuel is loaded, the launcher
shimmies as the engines are gimballed, and the rush of water on the
pad just before ignition.
[Donald K. Slayton, We Seven, 1962]

(195) 30 seconds after the boosters of the Atlas launcher are dropped, the
launcher for the Mercury flights, the Atlas was programmed to
go into a 14 degree pitch back towards the Earth.
[Donald K. Slayton, We Seven, 1962]

(196) It was also apparent that on some occasions when the boosters dropped away from the Atlas launch vehicle that the Mercury capsule would be enveloped in flames for a second or two. Something the astronauts needed to know so that they would not panic if this happened to them...
[Donald K. Slayton, We Seven, 1962][

(197) John Glenn, whose capsule was picked up by a destroyer while he was still inside, tried to crawl out through the top hatch of the Mercury capsule but found it easier to blow the hatch and come out that way. He did this on the deck of the destroyer and in the process badly bruised his knuckles - one of the prime pieces of evidence that backed up Gus Grissoms story on the mysterious hatch-blow that resulted in the loss of Gus's capsule.
[Donald K. Slayton, We Seven, 1962]

(198) Scott Carpenter, remembering that Gus Grissom lost his capsule when his side hatch blew, and that John glenn got hot staying inside his capsule, elected to go out through the top hatch and take his life raft with him. With perhaps the thinnest hips of the group, he found it fairly easy.
[Donald K. Slayton, We Seven, 1962]

(199) A survival knife was specifically contracted for the Mercury astronauts. They each had their own, but another was taped to the hatch on some of the flights. It was one of the strongets knives ever made, being hand forged and hand tempered from high grade Swedish steel that was so sturdy that it could be used like a chisel to cut through bolts.
[Goodon Coo[er Jr, We Seven, 1962]

(200) Al Shepards Mercury Capsule was the only capsule not to have a window through which he could admire the images of his home planet..
[Goodon Coo[er Jr, We Seven, 1962]

(201) Since the body tissue of pigs is very similar to that of humans, they strapped a live pig in a special contour couch - made the same way as the special moulded couches for the astronauts, to prove that the moulded couch would enable the astronauts to withstand higher impact G-loads when hitting the water than if they had a normal, cushioned couch.
[John Glenn, We Seven, 1962.]

(202) One of the simplest tools that the Mercury astronauts took with them on their flights was a little rod known as a 'Swizzle Stick'. It was used basically as an extension of their fingers if they had to pressurise their suits and couldn't reahc one of the switches...
[John Glenn, We Seven, 1962.]

(203) The highest G-load experienced by a human was when a Navy Lieutenant by the name of Carter Collins tested his own speciallu moulded Mercury couch, taking a load of 20.4G's for six seconds. The doctors who examined him revealed that some tiny blood vessels under the

surface of the skin had ruptured, but that this was not a serious injury and did Collins no serious harm.
[John Glenn, We Seven, 1962.]
(Can anyone check on the 'Highest load' statement, I mean that was 30 years ago!]

(204) The gloves for the Mercury astronaut space suits were woven in a special way. Nearly all the fingers were woven curved, so that the astronauts to grasp things even when the suit was pressurised, except the middle finger on the left hand, which was woven straight so that the astronauts could still get at the little recessed buttons on the control panel.
[John Glenn, We Seven, 1962.]

(205) The Mercury astronauts discovered that the helmets that they wore fitted best when they had a five-day-old haircut. John Glen refined this a bit and had his hair trimmed every three days before his flight.
[John Glenn, We Seven, 1962.]

(206) Deke Slayton's spacesuit was the only one made different due to one small complaint. They changed one of the zippers to one side, and split it into two separate zippers becasue it pressed right against Deke's ADam's apple and was afraid that it might be rather painful for him on the flight.
[John Glenn, We Seven, 1962.]

(207) The atsronauts had a name for the two different types of G-forces they experienced whilst training on their large centrifuge. When thrust back into their sieat, they called it Eyeballs in, and when thrust out of their seat, with a negative G-force, they called it, appropriately, eyeballs out.
[John Glenn, We Seven, 1962.]

(208) The main way the pilots could generate a zero-gravity environment was to go in a high parabolic flight. The way in which they kept the zero-gravity stable was to ignore the instruments and watch a little bright orange golf-ball on the end of a short nylon tether. They had to try and keep the golf-ball right in front of their face...
[Scott Carpenter, We Seven, 1962.]

(209) The Space Suit for the Mercury astronauts had a special neck-seal that they would use only if they were planning to dive into the ocean once they had returned. The seal prevented water from entering the suit through the helmet-ring and cause the astronaut to sink.
[Alan Shepard, We Seven, 1962.]

(210) The most dramatic failure of the Mercury program came in the testing stages when a Redstone and mock-up capsule were ready for launch. At "zero", the Redstone engines started and shut down straight away. In a fraction of a second the escape tower mounted on top of the capsule took off in a rush of flame, a parachute came out of the canister

where the tower had stood, and another parachute came out again in
quick succession.
It had turned out that the Mercury capsule had coped with the
Redstone failure precisely, as the escape tower took off because of
the lack of G-forces, and the parachute came out due to the
altimeter detecting that it was below the poitn where it should
have been activated on descent...
[John Glenn, We Seven, 1962.]

(211) The Mercury capsule, in the episode in item 210 above, began emitting
the radio tracking signal like it should, and the two Navy P2V
tracking planes 120miles away detected the beacon and started to
home in on the launch pad.
[John Glenn, We Seven, 1962.]

(212) Ham, the Monkey that tested the Mercury capsule out for the
astronauts, himself did not have an uneventful flight. First of
all, an oxygen valve had jiggled loose during launch, nd kept the
interior of the capsuel form pressuriZing. Fortunately the chamber
that enclosed HAM worked fine and it kept him sealed up and safe
during the flight. Also, the Redstone booster gave him an extra
1000 mph of speed. The escape tower detected th9is and gave him a
further 800mph. As a result the capsule went 130miles further
down range than it was supposed to.
[John Glenn, We Seven, 1962.]

(213) On the Morning of Alan Shepard's launch, the doctors noted that the
nail on the 4th toe of his left foot was coming loose because
someone had accidentally stepped on him, and he was peeling
slightly from a recent sunburn.
[John Glenn, We Seven, 1962.]

(214) John Glenn left a little note for Alan Shepard in the Mercury capsule
for when Alan would enter to make his flight. It said "No handball
Playing in this area."
[John Glenn, We Seven, 1962.]

(215) The lanyard they used on the hatches of the Mercury capsule to
detonate the explosive bolts was only 42 inches long. But the
explosive charges were enough to through the capsule hatch a
distance of 20 feet. The solution was to use some soft iron coils
which linked the hatch to the capsule sill.
[Virgil Grissom, We Seven, 1962.]

(216) The capsule clock for the 2nd Merucry spacecraft suborbital flight
actually rusted out, requiring a replacement quite rapidly even
though there were practiaclly no clocks anywhere to be found.
[Virgil Grissom, We Seven, 1962.]

(217) A crack was painted on the side of the Liberty Bell 7, the capsule
for Gus Grissom's flight. many people joked that it was the crack
the caused the capsule to sink after the flight...

[Virgil Grissom, We Seven, 1962.]

(218) During reentry the capsule would slow from 17,500 mph to 270 mph and reach a temperature of 9.500 degrees Farenheit - close to the temperature of the sun.
[John Glenn, We Seven, 1962.]

(219) The speed of the Mercury capsule meant that the astronauts would experience sunrise and sunset some 18 times quicker than we do on the surface.
[John Glenn, We Seven, 1962.]

(220) It was of no concern to John Glenn that his capsule was designated as number 13...
[John Glenn, We Seven, 1962.]

(221) The flotation collar, installed on the outside of the Mercury capsule by frogmen after splash-down, was first used on the third mercury flight, the first orbital flight, of John glenn.
[Malcolm Scott Carpenter, We Seven, 1962.]

(222) The Mercury controllers initially insisted that should the astronauts lose voice contact with the ground that they shoud immediately abort the flight. The astronauts argued this point when they proved that they could communicate with the ground almost as effectively using morse code.
[Malcom Scott Carpenter, We Seven, 1962.]

(223) It was initially disconcerting for John Glenn, siiting 74 feet above ground on the Atlas booster. It would sway slightly in a heavy gust of wind. In fact, he stated he was able to set the whole structure rocking himself, just be moving back and forth in the couch.
{John Glenn, We Seven, 1962.]

(224) One Mercury test flight resulted in the Atlas booster exploding during the period of maximum aerodynamic pressure, but the Mercury escape tower system worked just fine and the capsule came down in such fine condition that the engineers were able to use it again on another test flight.
Is this the first instance of reusability?
[John Glenn, We Seven, 1962.]

(225) A special instrmument was developed for the Mercury flights called an EXTINCTIONSPECTROPHOTOPOLERISCOPEOCCULOGRAVOGYROKYNETOMETER, but was called 'Voas meter' for short after Dr Robert Voas who developed it.
[John Glenn, We Seven, 1962.]

(226) Just 24 seconds before John Glenn made a transmission saying that he felt sections of his retro-packet breaking away during re-entry, Al Shepard had started to recommend to Glenn that he jettison the retro-pack as soon as the G's build up to 1 or 1.5. Glenn did not receive the message, however. The communication black-out had

already set in.
[John Glenn, We Seven, 1962.]

(227) The men aboard the Noa were so pleased that it was their ship that and not the aircraft carrier that had picked John Glenn and his capsule out of the water that they amde him a honorary member of the crew and presented him with a fifteen-dollar chack as the February winner of the 'Sailor of the Month" contest. He then endorsed the check over to the ship's welfare fund.
[John Glenn, We Seven, 1962.]

(228) After the Mercury flight, John Glenn was asked to walk on a straight rail laid on the floor in order to check his balance. Colonel Chuck Yeager, the famous test pilot who first broke the sound barrier, suggested later that this test only proved that John Glenn had been brought up near some railroad tracks.
[John Glenn, We Seven, 1962.]

(229) One of the forms that John Glenn was required to fill out after the flight asked the question "Was there any unusual activity during this period?" to which Glenn answere "No, just a normal day in space."
[John Glenn, We Seven, 1962.]

(230) Poker Flat is the only university-owned sounding rocket range in the world. The 5,200-acre facility is located about 35 miles from UAF's main campus in Fairbanks. The range launched its first rocket in 1969.
[From NSMCA@acad3.alaska.edu]

(231) When the DCX made it's inaugural hop on (date ?) in 1993, it's touchdown was only 6 inches away from the predicted target.
[sci.space, August 1993]

(232) While watching the cameras for the launch, we were watching the Beanie cap (the cap on the top of the ET (External Tank). When it lifted in term count, it revealed a salamander underneath it. Upon seeing the sun, it scurried into the ET GO2 vents (at the very top of the ET), and a couple of minutes later the shuttle lifted off. I am sure it was quite a ride until the atmosphere ran out...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(233) In 1991 Dr. Helen Sharman became Britain's first person in space, spending eight days on board Russia's MIR space station, conducting a range of experiments and other work.
Selected from over 13,000 applicants, after listening and responding to a radio advertisement, Helen spent 18 months in training for the Juno mission. A Chemical Engineer by profession, Helen Sharman is considered a role model by anybody who strives for achievement, values, training, relies on teamwork, and believes that the sky is the limit !
[From charles.radley@pcohio.com (Charles Radley)]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
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(9) There is also another story of the original white ET's. Apparently the
white (for some reason only white and not the current brown / orange
ones) attracted woodpeckers. They LOVED the tank, and they loved
pecking on it. Probably not a bright idea, but since they are birds...
[From HOLLIS@TITAN.KSC.NASA.GOV]

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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
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(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an

extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(8) One of my favorite stories (though you should probably check out the
veracity of it) is in regards to the Apollo program. Several of the
early launches were on Little Joe II rockets, which were solid fuel
boosters, and were designed mainly to test the escape tower system.
The Little Joe II rocket was described by one NASA official as being
"the most reliable booster we've ever built". On the last such flight,
the fuel charge in the Little Joe II shattered several seconds before
the scheduled test of the escape tower, creating a true emergency for
the escape tower to handle (the escape tower worked perfectly). The
Little Joe II launches, by the way, took place at White Sands Missle
range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(9) Is there any truth to the rumor that Dick Nixon ordered all plans for
the Saturn V destroyed so that they wouldn't fall into the hands of
the Soviets?
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(10) At one time, the Gemini space craft was going to land on land rather than on water, with a rather bizzare inflatible "hang-glider" instead of parachutes. (I remember having a NASA publication when I was a kid that had drawings of this configuration. It even showed the storage compartment for the inflatible wing running between the two hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
(Can anyone come up with some sources for backing up/refuting the last three items?)

****

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

125. SPACE TRIVIA LIST - 23rd August 1993 (Full list)

Newsgroup: rec.radio.amateur.space
Date: 1993-08-23 19:19:36 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Aug23.191936.9145@scorch.apana.org.au>
Source record: 28831
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

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##################################
# #
# SPACE TRIVIA LIST #
# #
##################################

Masterminded by:- THE NEWCASTLE SPACE FRONTIER SOCIETY
Temporarily Moderated by:- Luke Plaizier

PLEASE DIRECT YOUR SUBMISSIONS TO:-

EMAIL: lukpla@scorch.apana.org.au

snail mail: Luke Plaizier
c/o Newcastle Space
Frontier Society
PO Box 1150
Newcastle NSW
Australia 2300
Direct Voice: International - 61-49-54-7454
Inside Australia - 049-54-7454
Answering Machine - 61-49-63-5037

**************************************************************************

This is the list of Trivia information recorded in just over 25 years
of human activity in space. In no way is this an official list of events nor
is it guaranteed that all information included in this file is accurate or
true.
This file has come about due to the happy donations of time and
information of people on the internet located at various sites world wide,
and represents a collection of information that many of them have either
found interesting themselves, or would otherwise believe that other people
might find interesting.
The MOST important thing about this is that we'd like it to be built
by the input of many people, so if you can

PLEASE DONATE SOME TRIVIA AND WE WILL ENDEAVOUR TO ENSURE THAT IT
IS INCLUDED IN THIS FILE.

Submission details are included in the trailer to this list.

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* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
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(1) Even though Yuri Gagarin, on the first manned spaceflight, ejected
from his Vostok capsule just before landing, the official Soviet
report said otherwise for fear that the rest of the world might
not recognise the mission as a complete success.
(1a) The Federation Aeronautic International, the governing body for
aerospace records has rules specificially stating that the pilot
must be in control of the craft from take-off to landing. Vostok
cosmonauts ejecting clearly violated the rule so it was hidden.
See my book "Almanac of Soviet Manned Space Flight" for details.
Available from Zenith Books 800-826-6600.
[From dennisn@ecs.comm.mot.com]

(2) Radio frequencies in interstellar space between 1420 and 1720 MHz
are known as 'the water hole', as it is thought that alien
civilisations might converge and commune in radio frequencies
in this band of 300MHz. (1420 = Emission line of neutral
Hydrogen, 1720=same for Hydroxyl and together these two make
water.) [BIS, SPACEFLIGHT, Vol. 35, No. 4]

(3) In one day, SETI searchers at Puerto Rico and California, using
the new Targeted Search's Multi Channel Spectral Analyzer,
sifted through more information than had been collected on all
previous SETI efforts combined.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(4) Silicon Engine's new Targeted Search's Multi Channel Spectrum
Analyzer, developed for a 10 year NASA-funded SETI, is capable
if listening in on some 15million frequency channels, some
with a bandwidth of as little as 1Hz.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(5) The engines of the escape tower on the Apollo moon missions (on top of
the mighty Saturn V) were more powerful than the entire Redstone
launcher that put the first American into sub-orbital space.
[Paul.Keinanen@Telebox.tele.fi, steven@spri.levels.unisa.edu.au]
(5a) The Apollo LES (Launch Escape System) thrust was 654 kN, while the
Mercury-Redstone thrust was 347 kN. The Apollo CM mass was about 5800
kg and the LES mass was 4000 kg or about 10000 kg combined. The
accelleration would be about 65 m/s/s or about 6.5 G. As the maximum
accelleration during ascent for Apollo-Saturn V was about 4 G,
the CM+LES combination could still be separated, even if
the Saturn V engines would still be running at full thrust.
(5b) The engines on the Launch Escape Tower (LES) of the Saturn V are
indeed more powerful than the engines used on the Mercury-Redstone

booster. From [1], the LES has a thrust of at least 654 kN (147 klbf)
(Another figure of 689 kN (155 klbf) is also mentioned in [1]. The lower
figure may be the total downwards thrust since the engines have to
point at an angle to avoid burning up the Command Module if used.)
The Mercury-Redstone has a thrust of 347 kN (78 klbf) [2].
[1] M. Wilson, "Moon landing," Flight International, pp. 208-221,
6 Feb. 1969.
[2] K. Gatland, "The illustrated encyclopedia of space technology,"
Landsdowne Press, Sydney, 1981.

(6) March 19, 1959
"The Dept. of Defense announces that three atomic blasts were
detonated in space during 1958 as part of Project Argus using modified
X-17 rockets."
[-Eugene Emme, ed., _Aeronautics and Astronautics, p. 107.]

(7) LENGTH WARNING. This one is VERY large....
Hey, I don't know if you'll include this in your list of trivia but
it surely is amusing. After each launch countries are required by
treaty to announce the launch. There are no requirements about what
the contents of the announcement are. Shown below is a Chinese
announcement from 1975. It is mostly propaganda. Did you know that
launching a satellite refutes Confucius?
(Actual transcript has been shortened for space considerations.)

((TEXT) PEKING, DECEMBER 17, 1975 (HSINHUA) -- CHINA
SUCCESSFULLY LAUNCHED ANOTHER MAN-MADE EARTH SATELLITE ON

DECEMBER 16, 1975, UNDER THE GUIDANCE OF CHAIRMAN MAO'S
REVOLUTIONARY LINE, ON THE BASIS OF THE VICTORY IN THE
GREAT PROLETRAIAN CULTURAL REVOLUTION AND THE MOVEMENT
TO CRITICIZE LIN PIAO AND CONFUCIUS, AND IN THE EXCELLENT
SITUATION CHARACTERIZED BY CONSISTENT NEW VICTORIES IN
THE SOCIALIST REVOLUTION AND SOCIALIST CONSTRUCTION.
THE SATELLITE IS FUNCTIONING NORMALLY.
THE SUCCESSFUL LAUNCHING OF THE SATELLITE IS A NEW
ACHIEVEMENT MADE BY THE PEOPLE OF THE WHOLE COUNTRY,
UNDER THE LEADERSHIP OF THE PARTY CENTRAL COMMITTEE
HEADED BY THE GREAT LEADER CHAIRMAN MAO, IN TAKING CLASS
STRUGGLE AS THE KEY LINK, CONTINUOUSLY CONSOLIDATING
AND DEVELOPING THE FRUITS OF THE GREAT PROLETARIAN
CULTURAL REVOLUTION, AND FIRMLY CARRYING OUT THE SERIES
OF IMPORTANT INSTRUCTIONS OF CHAIRMAN MAO'S INCLUDING
THOSE ON STUDYING THE THEORY AND COMBATING AND PREVENTING
REVISIONISM, ON PROMOTING STABILITY AND UNITY AND ON
PUSHING THE NATIONAL ECONOMY FORWARD. IT IS A FRESH
SUCCESS ACHIEVED BY ADHERING TO THE PRINCIPLE OF
INDEPENDENCE AND SELF-RELIANCE, BRINGING INTO FULL PLAY
THE INITIATIVE OF BOTH THE CENTRAL AND LOCAL AUTHORITIES,
UNIFYING PLANNING, WORKING ENGERGETICALLY IN CLOSE
COORDINATION, WAGING A UNITED STRUGGLE AND GRASPING

REVOLUTION, PROMOTING PRODUCTION AND OTHER WORK AND
PREPAREDNESS AGAINST WAR.
THE CENTRAL COMITTEE OF THE COMMUNIST PARTY OF CHINA,
THE STATE COUNCIL AND THE MILITARY COMMISSION OF THE
CCP CENTRAL COMMITEE EXTEND WARM CONGRATULATIONS
TO THE WORKERS, COMMANDERS AND FIGHTERS OF THE PEOPLE'S
LIBERATION ARMY, SCIENTIFIC WORKERS, ENGINEERS AND
TECHNICIANS, REVOLUTIONARY CADRES AND MILITIAMEN WHO
HAVE BEEN ENGAGED IN THE RESEARCH, MANUFACTURE AND LAUNCHING
OF THE SATELLITE AND OTHER PEOPLE CONCERNED. 170110 UTT NY 17/O1224Z

(8) Neil Armstrong and Buzz Aldrin, the first men on the moon, almost
crashed onto the lunar surface. The Eagle's descent engine had
about 10 seconds of fuel left when they landed.
[From yantosca@bu.edu]
(8a) "The Eagle had landed on a countdown to abort, primarily because
propellants were sloshing away from intakes and meters, giving off
readings that the ship had entered the dead-man zone with its tanks
running dry."
[Submitted by davem@ee.ubc.ca, clarifying that although correct at
the time, post-flight analysis uncovered this problem, meaning
incorrect readings from the meters.]

(9) The maiden launch of the first Space Shuttle, "Columbia", occurred
on April 12, 1981, 20 years to the day of Yuri Gagarin's "Vostok"
flight.
[From yantosca@bu.edu]

(10) In 1963, the Soviet Union tried to launch a rocket (from Baikonur??)
but the main engine didn't fire. Several technicians were dispatched
to the launch pad to correct the problem, under the command of an
engineer/officer whose last name was Nedelin. Somehow, the
second stage engine fired, causing a massive explosion while the men
were still on the launch pad. It is estimated that more than 100 of
the Soviet Union's best rocket engineers and technicians (including
Nidelin) perished on that day. Ironically, there was one survivor;
he ducked into a fireproof box on the launch pad to smoke a cigarette
and was shielded from the blast. The loss of so many engineers and
technicians was a serious setback to the Soviet Space program; this
may have been one of the reasons why the Soviets did not reach the
Moon before NASA did.
[From yantosca@bu.edu, sourced from "AIR & SPACE / Smithsonian"]
(10a) The best account to date is in Rabochna Ya Tribuna, Dec. 6, 1990, p.4
"Top Secret: Explosion at Baykonur Cosmodrome: Only after 30 years are
we learning the truth about the death of Marshal Nedelin and a large
group of rocket speciallists", FBIS-UPS-91-002 from NTIS.
The author says numbers are still not known but range from 165
to 200 deaths. Happened Oct. 24 1960, Nedelin was the head of the
Strategic Rocket Forces (all ICBMs, launch crews, etc..). More than
one person survived, the rumor of the one survivor is that it was
Cheif Designer S Korolev, but this is unlikely. But it was not

his rocket design and he should have had no reason to be there. The cause is speculated to be the failure of circuit isolation during electrical testing actually sent the signal for the 2nd stage of the SS-7 to fire after repairs were made. The reference above has a good account of the fire by a man who was blown 30 meters by the blast and survived. Flim of the fire is available.
*NOTE: We'd like to thank the poster of this submission for his quick response for our request for more information.

(11) This is actually several combined into one, as they are from the same source. They are fact, but the exact source is unknown at the moment. Further SSME details have become available, and are located as items 149 - 160. Anyone with information as to the source of confirmation or denial of the following items, please direct email to the moderator.
(a) 2 SSME's could generate as much power as that used by a NIMITZ class aircraft carrier.
(b) The Fuel and Oxygen pumps of 3 SSME's combined could generate as much power as that used by the battleship IOWA plus 12 ETHAN class submarines.
(c) The combustion in 3 SSMEs combined, to make one shuttle flight system, releases more energy than the combined nuclear power plants of 9 non-US countries. (but which ones?)
(d) The turbo-pumps on the SSME rotate at 37,000 rpm. Formula One engines can rotate at up to 15,000 rpm. A standard 1990's vintage motor vehicle is very lucky to rev to 10,000rpm.
[PLEASE SEE ITEMS 149-160 FOR FURTHER SSME ITEMS]

(12) The LOX turbopumps on the F-1 engines of the Saturn V booster delivered 24,811 gallons of LOX per minute. They could have filled a swimming pool 25 feet long, 10 feet wide, and 6 feet deep in about 27 seconds. (In metric, the pumping rate is about 94,000 liters per minute, and the example swimming pool is 7 meters long, 3 meters wide, and 2 meters deep. The 27 seconds stays the same.)
[Source: "Apollo: The Race To The Moon", Charles Murray and Catherine Bly Cox, Simon and Schuster, New York, 1989, ISBN 0-671-61101-1, submitted by gbt@zia.cray.com]

(13) (This one is specific to 1993) Although june 21, the summer solstace in the Northern hemisphere is the longest period of daylight, July 1 was the longest day of the year worldwide! That is because at Z 00.00 (midnight world standard time) a leap second was added making July 1 24h00m01s long.....the longest day of the year!
[jbear@telerama.pgh.pa.us]

(14) Astronaut charm school included teaching the boys what socks to wear with which pants and shoes.
[mark.blevis@qmail.dgrc.doc.ca]

(15) After the first spacewalk, the Voshkod capsule carrying Alexei Leonov and Pavel Belyayev went off course and came down in the middle of a forest in Siberia. The two cosmonauts spent the night waiting for

rescue in the snow, huddled around a fire in their spacesuits,
listening nervously to wolves howling in the woods around them.
[Reference: Several sources, notable James Oberg's `Red Star in Orbit'
From alien@acheron.amigans.gen.nz]

(16) "A typical Perseid meteoroid that produces a visible meteor of
magnitude 2.5 has a mass of around *2.5 milligrams* and a velocity of
order *60 kilometres per second*. Such a meteoroid would inflict
severe damage - a crater of 5 cm diameter has been estimated - if it
struck an artificial satellite."
[RANDALLJC@UK.AC.PORTSMOUTH.CSOVAX]

(17) The Apollo 13 moon mission was launched precisely on schedule, 13:13
Houston time, April 11, 1970. On April 13th, en-route to the moon,
an oxygen tank in the service module exploded. The crew got home
safely thanks to the consumables and propulsion of the LM, and the
ingenuity of ground controllers in improvising LM lifeboat procedures.
The S-IVB stage which boosted the mission into translunar trajectory
was delivered to Kennedy Space Center on June 13, 1969--Friday.
[Apollo Expeditions to the Moon, NASA SP-350, Chapter 13; Stages to
Saturn, NASA SP-4206. From kelvin@autodesk.com]

(18) For a Motor Vehicle Engine to have the same power-to-weight ratio
as one Space Shuttle Main Engine, then it would only have to be the
size of your clenched fist. [SHUTTLE, Nigel MacKnight.]

(19) The Liquid Hydrogen Turbo-Pumps on a Space Shuttle Main Engine weigh
as much as a standard V8 Motor Vehicle engine, but output some 310
times the power. (See also item 150) [SHUTTEL, Nigel MacKnight.]

(20) The Apollo 12 moon mission in 1969, following closely on the heels of
the Apollo 11 mission, was struck by a bolt of lightning just after
it left the launch pad.
[SHUTTLE, Nigel MacKnight.]
(20a) Atlas-Centaur AC-67, launched on March 26, 1987, was hit by
lightning and started to deviate from its planned course some
49-seconds after lift-off. Range Safety officials destroyed the
vehicle.
[Space Flight News, May 1987]
{If anyone has record of any-other lightning strike, then let
us know because it belongs here!}

(21) The VAB, where Space Shuttle components are assembled today, and
Saturn V components were assembled in the 60's and 70's,
occupies a ground area of 8 acres and boasts an internal
volume of 3,624,000 cubic metres (129,428,000 cubic feet!)
The structure was designed to withstand winds of 200km/h
(125 mph) and has a foundation that rests on more than 4200
steel pilings 40 cm (16 in) in diameter that each go to a
depth of 49 metres (160 ft) through bedrock. The building
has its own internal weather!
[SHUTTLE, Nigel MacKnight.]

(22) There was an aluminium shed near launch pad 39A. It was roughly
50 yards away from the perimeter. It was a prefab
building and it wasn't determined whether it would stand up
to the first launch of the shuttle or not. After the first
launch of Columbia, the shed was reduced to a few pieces
of debris scattered across the ground.
[SHUTTLE, Nigel MacKnight.]

(23) Noticeboard of Safety requirements inside the VAB:-
REMOVE PERSONAL ITEMS FROM THE UPPER POCKETS. WEAR BADGES
INSIDE SHIRT OR CARRY IN PANTS POCKET. REMOVE WATCHES AND
RINGS OR TAPE SAME. EYEGLASSES MUST BE TETHERED. ACCESS
RESTRICTED WITHIN THREE FEET OF VEHICLE-CONTACT ACCESS
CONTROL MONITOR. FOOD AND BEVERAGES PROHIBITED. FLAMMABLE
LIQUIDS MUST BE APPROVED. NO HARD HATS ALLOWED.
[SHUTTLE, Nigel MacKnight.]

(24) I worked at the Johnson Space Center, and during a material testing
procedure on Space Suit Assemblies I got to play with a heat-soaked
shuttle tile cube. It was a one-inch cube, and it was soaking in an
oven at about 1400F. We took it out of the oven with tongs and then
you could hold it by the edges, preferably the corners. You did not
want to touch the face of it - by minimizing the surface that you were
in contact with you could minimize the heat transfer.
It glows (visibly) just a little, but it sure shows up on
infrared Kokak slide film :-)
[From jgladu@bcm.tmc.edu]

(25) The Software programmes controlling the Shuttle's on-board computers
are the most sophisticated programmes ever developed for a
spacecraft, and contain over 500,000 IBM-written instructions. This is
twenty five times more than the programmes developed for the Saturn
launch vehicle which guided Apollo astronauts from launch, through
orbital insertion and into lunar trajectory.
[SHUTTLE, Nigel MacKnight.]

(26) John F. Kennedy Space Center, or KSC as it is more usually referred to,
is situated on Merritt Island. The operational areas are located
adjacent to Mosquito Lagoon. Visitors soon find out that the
lagoon did not receive its name frivolously, and that a reliable
brand of mosquito repellant can be worth its weight in gold!
[SHUTTLE, Nigel MacKnight.]

(27) And then there are the Alligators at KSC. Many of the 'gators have
become quite tame, and some have developed the habit of clambering
out of the pond in front of KSC's large canteen facility to 'beg'
for scraps of food from the office workers who eat their lunch
outside on the lawn.
[SHUTTLE, Nigel MacKnight.]
(27a) This is a big problem at KSC (Not "The Cape" as many call it...)
because alligators are REALLY stupid. They can't tell the difference
between a sandwich or your hand...In fact to them there IS no
difference. We are warned over & over in the "KSC bulletin" not to

feed them. Since KSC is a nature preserve, it is illegal to feed the 'gators. If caught, you can be disciplined. When the alligators lose their fear of humans, they are caught and moved to a remote part of the preserve. If they come back the alligators are killed. Period.
[From HOLLIS@TITAN.KSC.NASA.GOV]

(28) The oxygen tank of the External Tank of the Space Shuttle Transportation System occupies a small section at the front of the tank, whilst the Hydrogen Tank occupies the rest below it. The Hydrogen Tank is 2.5 times larger than the Oxygen tank, but weighs only one-third as much when filled to capacity. This difference comes about because liquid oxygen is some sixteen times more dense than liquid hydrogen.
[SHUTTLE, Nigel MacKnight.]

(29) The Crawler-Transporter, which carries the Space Shuttle, and previously the Saturn series of launch vehicles from the VAB to one of either launch pads 39A or 39B, is as wide as a 12 lane highway.
[SHUTTLE, Nigel MacKnight.]

(30) There are eight sets of tracks on each Crawler Transporter - two in each corner - and each set of tracks is comprised of fifty seven segments weighing one-ton apiece. That totals up to over 450 tons in track segments alone!
[SHUTTLE, Nigel MacKnight.]

(31) The Crawler Transporter isn't exactly good where fuel economy is concerned. Travelling at the rate of a mere 1 mile per hour, it guzzles fuel at the rate of of one gallon every twenty feet! Instead of Miles per Gallon, it is measured in Gallons per Mile!
[SHUTTLE, Nigel MacKnight.]

(32) On July 20, 1969, Houston Mission Control put through the longest-distance telephone call in history. It connected Richard Nixon to the two astronauts, Armstrong and Aldrin, on the surface of the moon.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(33) The Apollo Spacecraft, which carried astronauts to and from the Moon, had nearly two million working parts. A large Motor Vehicle has less than 3,000.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(34) Initially scheduled to be called "Constitution", the first Space Shuttle orbiter, OV-101, was renamed "Enterprise" in deference to "Star Trek" television series fans.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(35) There is another unknown orbiter in the Space Shuttle fleet. Tagged OV-098, the craft itself was named "Pathfinder". Its original role was as a rough dimension-and-weight mock-up for practising de-orbit operations on the run-way, and also to practise lifting and handling

the orbiter at various facilities (Shuttle Carrier Mate De-Mate,
VAB and OPF). The vehicle was heavily modified to eventually look
like the other orbiters for the "Great Space Shuttle Exposition"
scheduled for June 1983 to August 1984. The craft was returned to
MSFC and is on display today, with Filament wound boosters and
the tank used in the main propulsion tests (MPTA-ET) at the
Space and Rocket Center near Hunstville.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(36) The Soviet Voskhod spacecraft, in follow-on to Vostok flights, was
essentially just a one-manned Vostok spacecraft. All three cosmonauts
launched in the spacecraft were without spacecsuits. Officially this
was reported to be because the Soviets were confident with the
spacecraft, but a quick calculation reveals that there would not
have been enough room for the three men if these spacesuits had been
included!
[The Soviet Manned Space Programme - Salamander Books]
(36a) The real trivia here I believe is the fact Korolevs engineers did
not want to make the modification believing it a bad idea, then
Korolev offered to fly one of the engineers on the first flight
and they accepted the mission, Feoktistov was the lucky engineer.
This was really part of Korolevs plans to get speciallists into
space to learn and stop all flights from being all military
pilots. Journalists were also selected for Voskhod missions.
[dennisn@comm.mot.com (Dennis Newkirk)]
(36b) This was repeated with Soyuz, stuffing three people without pressure
suits into a spacecraft designed for two with suits, resulting in the
deaths of the Soyuz-11 crew when the spacecraft vented its atmosphere
during reentry. After that all crews have worn pressure suits even
when (from Soyuz-12 to T-5) this reduced the crew size from three to
two.
[Mark Grant <mark@isltd.insignia.com>]

(37) The Soyuz spacecraft was initially designed by the Soviets for their
attempt at getting to the Moon before the Americans. But the orbital
Module of the Soyuz spacecraft was missing one vital component -
a transfer tunnel in the docking adapter. If it ever became necessary
to transfer crew or equipment to a Lunar orbiter or Lander, then
cosmonauts would have had to climb into suits and go into the
vacuum of space! The docking tunnel was added for later space-station
operations.
[The Soviet Manned Space Programme - Salamander Books]
(37a) The lunar module docking drouge was just a metal honeycomb type
crushable receptical for the LOK (lunar Soyuz) probe which just plunged
into the material and hung on. It was only used once per mission anyway.
[dennisn@comm.mot.com (Dennis Newkirk)]

(38) The EDO (Extended Duration Orbiter) toilet is indeed different from a
standard shuttle toilet. The standard shuttle toilet has a bowl that
is used to contain fecal wastes. The waste material is freeze dried
when it enters the bowl. The current toilet is able to support flights

of up to 13 to 14 days. Modifications to the toilet are expected to increase this to about 16 days. The EDO toilet (This is the one making all the headlines about cost overruns) has just had the qualification unit complete its second flight. The 23 million dollars only produced a qualification unit. NASA has not purchased any actual flight units yet. The EDO toilet is different in that in place of the bowl there is a canister that is used to collect fecal wastes. Each canister can support 23 to 27 uses depending on what else the crew throws down there. When the canister fills up, it is replaces with a fresh canister. The drawbacks to this toilet are that the canisters require a lot of storage space that is not required by the standard toilet. The standard toilet has been in use since STS-1, while the EDO toilet is undergoing testing on OV-105 only. The standard toilet must be removed from the vehicle after each flight and returned to JSC for cleaning and processing. The EDO toilet can remain in the vehicle and thus saves processing time.
[From oliver@vf.jsc.nasa.gov. This item came about in the discussion pertaining to the legitimacy of #5]

(39) Some western speculators, back when the Soviets were still in the race to beat the US to the moon, were wondering what the Soviets would use as a lunar lander, as they could not (until recently) find evidence of a separate lunar lander vehicle. They came up with the concept that an enhanced Soyuz, complete with landing legs, would be used to land vertically on the surface of the moon, and even used the re-positioning of the main hatch to verify this! This would mean that a cosmonaut would have had to descend a ladder some 2 stories high to get to the Lunar Surface!
[The Soviet Manned Space Programme - Salamander Books]

(40) In the early 80's, the soviets were flying small 'cosmos' experimental vehicles which confounded international observers. Cosmos 1374, launched in June of 1982, was recovered in the Indian Ocean. The soviets issued a standard Cosmos-type announcement, failing to include an orbital period, yet stating that the mission was a success. The next similar flight, cosmos 1445, came nine months later. The retrieval of this one, simlarly with 1374, was observed by the Royal Australian Air Force, but in this case photographs were released to the rest of the world, revealing that the soviets had been testing a a small winged orbiter, with demensions of 3.4m length, 1.4m fuselage diameter and a wingspan of 2.6m.
There are two more interesting notes. Firstly, Cosmos 1374, unlike 1445, did not have any identifying national markings, indicating that the RAAF was an undexpected visitor to the retrieval area. Secondly, the reovery ship (the Yamal) and apparently many members of the the Soviet recovery team, were the same for both spacecraft retrievals. There is one man with an identical head of Afro-styled hair who appears in both photographic series of the retrieval sequences, despite the two missions happening 285 days apart!
[The Soviet Manned Space Programme - Salamander Books. Peter Pesavento, Correspondence to the BIS Spaceflight magazine, Sept 1991.]

(41) The soviets had a large Saturn V type booster in development for the soviet manned assault on the Moon. This launcher was designated by many names, namely by G-1 or G-1e in the west in early years, but now as the SL-15 or N-1 booster). By mid 1966, US reconnaissance satellites spotted test facilities under construction at Tyuratam. By 1968 static test models had been built and between March and April a full sized version was moved from its fabrication area to the launch pad and back.
[The Rocket - David Baker - New Cavendish Books.]

(42) The attempts to launch the G-1/N-1/SL-15 soviet booster are:-
(a) February 21, 1969: The booster exploded 70 seconds after lift-off, when a fire developed in the tail section of the rocket. The booster was labelled 3L, and had an L-1 Zond Spacecraft.
(b) July 3, 1969: A liquid oxygen pump failed causing an explosion that wrecked the launch site. Designated 5L, this booster is assumed to have had the same payload and launch aim as the first, namely to enter an orbit to the moon and attempt a lunar flyby.
(c) July 21, (Or June 27?) 1971: The rocket fell back on the launch pad causing more extensive damage.This launcher, designated 6L, had a mock-up of the lunar module, lunar lander and escape system.
(d) November 23, 1972: A fire developed in the engine compartment close to the end of the 1st stage burn and the booster exploded after 107 seconds of flight. Designated 7L, it had a proper lunar orbit module and escape system and a mock-up lunar landing module. It was planned this would be an Apollo 8 style, but unmanned, lunar flyby.
[BIS Spaceflight, June 1991 and June 1992]

(43) The one remaining G-1/N-1/SL-15 heavy lift booster (the fifth in the series that were built), which did not get a chance to fly due to the cancellation of the program, was partially converted into a bandstand for a town close to the launch site.
[BIS Spaceflight, June 1991]
(43a) The 8L booster was nearing a 1974 launch date. Another booster was also being readied, parts for more were on hand. All assembly was done at Baykonur. There was growing confidence these boosters would perform better since significant modifications were made from the 4th launch onward.
[dennisn@comm.mot.com (Dennis Newkirk)]

(44) There were several things to mention about Helens Sharman's flight to the MIR space station on May 18, 1991.:-
(a) Great Britain was the 22nd nation to fly a citizen into space
(b) Helen Sharman was the joint 248th person in space
(c) She was the 15th woman into space
(d) For the first time a nation's first space traveller was a woman.
(e) She was the first non-soviet, non-american woman into space.
(f) One record that was just missed: because the American Space Shuttle Columbia was delayed from its scheduled launch

date of May 22, the chance to set a new record or 4 women
in space simultaneously was lost. (This was sts-40, which
finally took off on June 5th.)
[BIS Spaceflight, July 1991 - Please see item 233]

(45) Gagarin's flight began under a cover of secrecy. Nobody except the
heads of Korolev's design bureau and the KGB knew of the place of
landing. The inhabitants of Saratov could not even have suspected
how close they were to the historic landing site.
But the secrecy wasn't complete. Skilled workers were required
to deal with measuring and other devices to dismantle them. These
workers were taken by KGB agents from one of the nearby plants. They
were told by the director of the plant that they were close to the
landing site of Vostok.
One of the workers had a camera and was able to take a clear
photograph of Vostok that wasn't released until 1991!
[BIS Spaceflight, August 1991. And they show the photo!]

(46) The Lunar Landing Research Vehicle, developed to train US astronauts
on how to control the Lunar Lander for flights to the moon, was
a strange contraption built with a turbofan engine facing down
vertically in the centre to provide vertical thrust with a weight
distribution and throttle reaction time similar to that of the
real Lunar Lander. It was based around the early VTOL 'Flying
Bedsteads' developed to study the potential of Vertical Take-Off
and Landing for jet aircraft.
[Ed Henegveld, BIS Spaceflight, December 1992]

(47) Neil Armstrong had a close brush with death in a 'flying bedstead'
LLRV on May 6th, 1968, when the craft went out of control and he
was forced to eject. He landed by parachute and walked away without
injury!
[Ed Henegveld, BIS Spaceflight, December 1992]

(48) Yuri Gagarin, on the maiden launch of a man into space, landed in a
field some 26km south-west of the town of Engels in the Saratov
Region. In his orange flight-suit he approached a woman and a little
girl with a calf. The cosmonaut was asked if he came from space.
And of course he replied "As a matter of fact, I have!"
[Neville Kidger - BIS Spaceflight, April 1991]

(49) Compared with the desired profile, the edge of the mirror surface
of the primary mirror on the Hubble Space Telescope is too low by
0.002mm. This results in an error where the Light from the edges
of the mirror come to a focus about 38mm beyond where the innermost
rays converge.
[BIS Spaceflight, April 1991]

(50)The US Army Redstone missile has had a long and ditinguished service
record.
(a) A modified redstone, redesignated Jupiter C or Juno 1, sent into
space the United States first satellite - Explorer 1 - on

January 31, 1958.
(b) It was used for the first manned American spaceflights of Shepard and Grissom in 1961.
(c)It was the first rocket to detonate an atomic weapon (Project Hardtrack in 1958) above the Earth's surface.
(d) It was the launcher used in Project SPARTA, a joint US/UK/Australia programme of re-entry research. The last of the 10 Redstones shipped to Australia for the project was used to launch WRESAT, Australia's first satellite.
[Keith Scala, Michael Crowe, BIS Spaceflight, August 1991.]

(51) The first real watch to be worn in space (Yuri Gagarin had a timepiece which was not a true Chronograph) was in July 1962, when Scott Carpenter flew the Aurora 7 Mercury capsule.
[Alan A Nelson - BIS Spaceflight, April 1992]

(52) The Omega Speedmaster Professional, later to become standard issue to all Gemini, Apollo and Skylab Astronauts, was first flown by Wally Schirra aboard Sigma 7 in October 1962. This watch was later known as the "Moon Watch" as it was the first watch worn on the Moon.
[Alan A Nelson - BIS Spaceflight, April 1992]

(53) The television series 'The Six Million Dollar Man' showed a terrible aircraft accident at the beginning of each episode, supposedly indicating how 'Steve Austin' was injured. The actual sequence was of a real accident on May 10, 1967, when NASA test pilot Bruce Peterson was fortunate to escape with his life in an experimental aircraft known as the M2-F2 lifting body. This small craft was part of a development to test the aerodynamics of small wingless craft that could generate aerodynamic lift through the simple shape of its body. They came thundering down at incredible speeds, and attribute much of the information that is required today for the one-attempt-only langings made by the Space Shuttle.
[Space Flight News, May 1986. (No longer Published.)]

(54) The Apollo 10 crew of Tom Stafford, John Young and Gene Cernan put themselves in the record books by achieving the highest speed ever attained by man - 24,790mph.
[Space Flight News, July 1986. (No longer Published.)]

(55) The Lunar Rover, as used on Apollo missions 15, 16 and 17, had a lifetime of 78 hours, and could cover up to 92kms. It could carry up to 400kg (Earth weight) - more than TWICE its own weight. (An average family car can usually only carry half its own weight). Fully loaded it could climb a 25 degree slope, and on the flat it could reach a top speed of 16km/hr. It would be an almost precise 1/6th slow-motion replay of a car going 86km/h on Earth!
[Space Travellers Handbook, Michael Freeman, Sovereign Books.]

(56) A 'logical lock' was in use on the Vostok spacecraft to lock out any actions that Yuri Gagarin might make in a panic. At that time, nobody knew how a human would react to space, so the logical lock idea was

created. Yuri Gagarin had a small envelope in which the logical lock code was written, and in order to use the controls he would have to prove that he was capable of doing the simple task of reading the combination and punching 3 of nine buttons.
[Space Flight News, November 1986. (No longer Published.)]

(57) There is a slide wire 'flying fox' type system at both launch pads 39a and 39b that the astronauts can use in the event of en emergency at the launch pad.
[Space Flight News, February 1987]

(58) At the base of the slide wire system used for emergency astronaut escapes at pads 39a and 39b, is a modified military M113 tank used to evacuate the atronauts and support personnel from the vicinty of the launch pad in a protective environment. In actual fact there are 3 tanks. One near the base of the slide wire, one at the blast demarkation line some 4,485ft from the launch pad, and another three miles away in the hands another fire/rescure team.
[Space Flight News, February 1987]

(59) The military has a long history of starting and then dropping astronaut and other manned programs - such as the Manned Orbiting Laboratory, the Dyna-Soar, etc.
The latest one was the Manned Spaceflight Engineer program - and it did succeed in getting two Air Force payload specialists onto the Space Shuttle. Gary Payton (STS-51C) and Bill Pailes (STS-51J) flew before the Challenger accident.
After Challenger the whole program was reconsidered and the military decided to concentrate on unmanned launch vehicles. The MSE program was disbanded and the people reassigned.
The person who had probably the best chance of flying next was Kathy Roberts - but the Air Force dropped the program before she flew.
[from CHARLES D. PHILLIPS]

(60) The Johnson Space Center in Houston has two control rooms where technicians can monitor the Shuttle's onboard systems. The original control and display consoles in these rooms (dating back to the mid 1960's and the Gemini program) are still in use today. In the near future these consoles will be replaced with modern computer workstations.
[Tour Guide, Johnson Space Center, Houston TX
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(61) Both of the control rooms at JSC have a viewing gallery behind a wall of one-way glass. These viewing galleries are open to the public on days when the Space Shuttle is NOT in orbit (for security reasons). In fact, the galleries are closed to the public 24 hrs before launch time. However, VIPs (the President, Senators, Congressmen, and visiting dignitaries) occasionally are present to watch the progress of a Shuttle mission from these galleries.
[Tour Guide, JSC from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(62) The first time four spacecraft had ever been docked together came on 22nd April, 1987, when the Russians had together Soyuz-TM2, Mir, Kvant and Progress 29.
[Space Flight News - May 1987]
(62a) There is a vastly superior record which was set on January 26, 1993. Soyuz TM-16 docked with the MIR space station, whilst both Soyuz TM-15 and Progress M-15 were still there. The existing spacecraft consisted of the MIR central core, Kvant, Kvant 2 and Kristal.
[BIS Spaceflight, May 1993]

(63) On the first four flights of Columbia, there were only two crew members, the Commander and the Pilot. Each was launched seated in a modified version of the rocket ejection seat installed in the SR-71 'Blackbird'. This seat could safely eject them away from the Orbiter in case the control system should malfunction and send it out of control.
[Bob Overmyer, Space Flight News, May 1987]

(64) Originally it was thought that the shuttle ejector system could be used to eject from the launch configuration as long as the Shuttle system was below 100,000 feet, but it was discovered later that once the solid rocket motors were burning, a crewmember ejecting would descend into the rocket plume.
[Bob Overmyer, Space Flight News, May 1987]

(65) Crew safety concerns for the shuttle heightened when the results of the ditching tests conducted at the U.S. Navy David Taylor Model Basin become known. At the Taylor test facility, large-scale models of the Orbiter were catapulted over a long water trough. They contacted the water in attitudes and speeds simulating Orbiter ditching conditions. No-one had ever ditched an airplane at the typical landing speeds of the Shuttle and the results were disappointing. When the model contacted the water in the flat attitude that was achieved with a normal landing speed of 200 knots, it would skip badly and become airborne again. The second or third contact was usually very violent, resulting in forces that would totally destroy an Orbiter.
When the model simulated the slower landing speeds made possible by the delta-wing configuration, the nose-up attitude would cause the body-flap to contact the water first, and the cockpit would pitch down violently, slamming into the water.
One interesting test showed that if the orbiter approached with the landing gear down, it would immediately turn into a 'submarine' and dive straight to the bottom!
[Bob Overmyer, Space Flight News, May 1987]

(66) On STS-5, there were 5 astronauts on board, but the two ejection seats remained in place unarmed. It had been originally proposed that the escape sequence would continue as follows:-
The astronaut seated in the centre seat on the flight-deck would leave his seat and descend to the mid-deck if an emergency arose. The

three in the mid-deck would then don parachutes, wait for the Commander and Pilot to eject, and then climb through the two holes in the roof. This was rejected quickly, as it was found that the control wires would be severed in the roof after the ejection, and the orbiter would definitely go out of control. Besides this, those that crawled out would be brought around and slammed into the OMS pods on the rear of the orbiter!
[Bob Overmyer, Space Flight News, May 1987]

(67) Using a small setup of around 25-pounds worth of Radio equipment, a teacher and a group of students at Kettering Grammar School, England, were regularly keeping track of the Soviet 'eight day wonders' - recoverable satellites in the cosmos series. In 1966, differences in some of the orbits led to the discovery of a new Soviet launch site that had previously been a closely guarded secret of the USSR and the Pentagon. This site was christened in the west as 'Plesetsk'. Nearly 20 years passed before the Soviet Union publicly announced the existance of the site, and the Kettering group were proud to hear that they maintained the same name.
[Space Flight News, May 1987]

(68) The kettering group, a small team of students and their teacher at Kettering Grammar School, England, were keeping track of the Soviet Soyuz-11 manned spaceflight. They received the signals of the depressurization of the Soyuz module, and were keeping track of the cosmonaut's heartbeats up until they lost contact. The capsule would have landed within 30 minutes of this loss of signal, but unfortunately all three cosmonauts were found dead. If they had been wearing their space-suits at the time, they might have survived.
[Space Flight News, May 1987]

(69) In the weightlessness of space, the antennae of the big Hughes Intelsat 6 spacecraft would be able to unfurl on their own, but during Earthly tests the two larger antennae needed some help to defy gravity. Engineers at Hughes Aircraft Company in El Segundo, California, turned to Helium-filled ballons to perform the task!
[Space Flight News, June 1987]

(70) The current soviet spacesuit, used on-board the MIR space station, requires the cosmonaut to swing the back-pak around and step into it from the back!
[Space Flight News, July 1987]

(71) Believe it or not, the final analysis showed that, although 'Columbia' basically had about 30,000 separate tiles on its exterior, they installed - in the period from May '79 until it finally flew in April '81 - a grand total of over 90,000 tiles!
[Bob Overmyer, Space Flight News, July 1987]

(72) On STS-5, even though the commander and pilot ejector seats were disarmed, those two astronauts had to wear the SR-71 harness-type

waistcoat in order to remain compatible with the seat!
[Bob Overmyer, Space Flight News, July 1987]

(73) STS-5 was also the first time astronauts wore the now familiar
pale-blue suits used before the Challenger accident. (This was
used in place of the SR-71 type flight-suits used on the first
4 flights.)
[Bob Overmyer, Space Flight News, June 1987]

(74) The shears used by astronaut Joe Kerwin to sever the strap of debris
retaining the jammed solar wing on the Skylab Space station, were of a
type more usually employed for snipping barbed wire. Manufactured in
Missouri, they were purchased by NASA for the princely sum of $75!
[Space Flight News, August 1987]

(75) Whilst the Shuttle was still in development, Fred Haise amd Jack Lousma
were scheduled to pilot STS-3 which was to have boosted Skylab back
into orbit. Alas, Skylab to down in Western Australia in 1979, 2 years
before the 1st flight of Columbia.
[Bob Overmyer, Space Flight News, October 1987]

(76) The Soviets have a long-standing custom of only calling their people
'Cosmonauts' after they have travelled in space. This conflicts with
the US version, where astronauts are so named as soon as they have
been accepted into NASA employment after passing the selection tests.
[Space Flight News, August 1987]

(77) Pete Conrad became the first tattooed man in space on the Gemini 5
mission. He had a blue anchor and stars tattooed on his right arm.
[Space Flight News, October 1987]

(78) To train Shuttle pilots prior to making their flight, in the area of
landing, NASA uses a modified Gulfstream 2 executive jet. The cockpit
has been divided into two - with Shuttle controls on the left, and
all the Gulfstream controls on the right.
[Space Flight news, December 1987]

(79) The flight dynamics of the Shuttle were calculated before the Shuttle
actually flew, and the Gulfstream 2 trainer was modified accordingly.
The calculations were quite accurate, and very few changes have been
made since the Shuttle has entered service.
[Space Flight news, December 1987]

(80) The following is a long list of trivia tid-bits which comes from the
December 1987 issue of Space Flight News. It was published as a quiz,
and the answers were found in the same issue. Only those questions
worthy of being items of trivia are included.
(a) This is a list of 'should not have but did' of what some astronauts/
cosmonauts took into space.
(i) The crew of Vostok 2 used a box of matches they carried in
their flight to light a fire after they had overshot the landing
zone.
(ii) Tom Stafford took a small set of handbells along for the

Gemini 6 mission, which took place just before Christmas.
(iii) The crew of Apollo 15 broke NASA regulations, and were later severely reprimanded, for carrying a batch of first-day covers to the surface of the moon in their personal lockers.
(iv) Gus Grissom ate a corned beef sandwich on the Gemini 3 mission. It was given to him by his crewmate, John Young, who had sneaked it on board. (The sandwich was given to John Young by Wally Schirra.) Grissom later vomited, ruining a dietary experiment NASA had set for him.
[Wally Schirra addition, from Allan Bourdius <ab3o+@andrew.cmu.edu>]
(b) Bits 'n Pieces.
(i) A helmet visor was cracked on the Gemini 3 mission, when Gus Grissom's helmet struck the instrument panel as he was thrown forward during the automatic parachute descent sequence prior to splash-down in the Atlantic Ocean.
(ii) A camera was left in Earth Orbit during the Gemini 10 mission.
(iii) A feather was dropped on the Apollo 15 mission. This was done alongside a hammer to prove that one of Galileo's most significant laws was indeed correct. The feather and hammer hit the surface of the Moon at the same time.
(iv) Apollo 16 astronaut John Young tripped over one of the leads attached to ALSEP, rendering it useless and falling to the surface.
(v) Valentina Tereshkova bruised her nose on the landing of Vostok 6 in June 1963.
(c) Planetary Bits
(i) Luna 3, the Soviet Probe, returned the first pictures of the Moon's previously unseen farside in October 1959.
(ii) Luna 10 became the first spacecraft to enter orbit around the Moon in April 1966.
(iii) Venera 4 became the first successful soviet mission to Venus by delivering a small capsule in October 1967.
However, it was crushed before it reached the surface. Venera-7 in 1970 was the first mission to successfully land.
[Venera 7 item added by jcm@urania.harvard.edu (Jonathan McDowell)]
(iv) Venera 9 returned the first pictures of Venus' surface in October 1975.
(v)Mariner 10, from the US, is the only spacecraft ti have reached Mercury. It made 3 flybys of the planet.
(vi) Pioneer 10 was the first operating spacecraft to cross the asteroid belt en route to Jupiter.

(81) On the first separation test of Enterprise and the Boeing 747 in the Approach and Landing Test program of 1977, the Shuttle separated from the 747 that the first photograph - initially intended to be taken when the orbiter was a few feet away from the orbiter - was taken when the orbiter was over 70 feet away from its carrier.
[Bob Overmyer, Space Flight News, March 1988]

(82) The original circular hatch to be used for entering and exiting the Lunar Module on the surface of the Moon was squared-off when

astronaut Roger Chaffee observed that it was difficult to clamber through a round hatch with a square backpack on - particularly going backwards.
[David Shayler, Space Flight News, April 1988]

(83) Descent and Ascent stages of the Lunar Module were passed through a bizarre procedure to ensure that loose parts or tools weren't left lying around inside it. This involved mounting the device on a large support structure and rotating it slowly to free loose items and let them drop to the floor.
[David Shayler, Space Flight News, April 1988]

(84) Once locked into their landing position, the legs on the descent stage of the Lunar Module could not be retracted again.
The same is also true of the landing gear on the space shuttle.
[David Shayler, Space Flight News, April 1988]
[Shuttle addition from Allan Bourdius <ab3o+@andrew.cmu.edu>]

(85) The landing probes on the feet of the Lunar Module were fitted to all but the forward gear. The probe was removed from this leg after astronauts McDivitt and Schweickart tested the Lunar Module LM/3 Spider in Earth orbit for the first time in March 1969. It was thought that the probe might curl up and prove to be a hazard to the astronauts as they stepped on and off the final rung of the ladder that led them to the surface from the exit hatch of the Module.
[David Shayler, Space Flight News, April 1988]

(86) The ladder mentioned above was made of a material that was so light-weight that it could only support the weight of a man in the 1/6th gravity of the Moon. On Earth the ladder would break.
[David Shayler, Space Flight News, April 1988]

(87) Because the Lunar Module did not have an air-lock, the Module had to be depressurized and repressurized before and after every excursion. For this reason and as a general safety precaution, the hatch was left slightly ajar as the astronauts were roaming around the surface. Imagine being locked out of your vehicle so far away from home!
[David Shayler, Space Flight News, April 1988]

(88) On Feb. 21, 1969 in the final hours of the countdown of the first launch of the massive N1 booster, Cheif Designer Mishin went to the launch pad while propellants were still being loaded, and cristened the rocket traditionally be breaking a bottle of champaign against the cold hull of the rocket.
[IZOBRETATEL I RATSIONALIZATOR, No. 8, Aug, 1990, pp 20-21, "The History of Technology: How We Conceeded the Moon: A Look by One of the Participants of the N-1 Drama at the Reasons Behind it", by Vad. Pikul. FBIS-USP-91-002. Submitted by dennisn@ecs.comm.mot.com]

(89) Lazarev and Makarov, the crew of Soyuz 18-1, who were forced to abort the launch after half the explosive bolts holding the first and second stages of the booster together failed to blow. After a 14g reentry

from 90 miles up their capsule hit a mountain near the Chinese border
and rolled down, leaving another crew to spend a day huddled round a
fire waiting for rescue.
[Source: Janes Manned Spaceflight Log,
from Mark Grant <mark@isltd.insignia.com>]

(90) Although during the day it is only possible to watch a shuttle launch
with the naked eye until just past SRB seperation, a night launch
with clear skies can be followed until the main engines cut out.
[Source: STS-35, which we could see until it disappeared behind a
cloud when 1200 miles downrange. Mark Grant <mark@isltd.insignia.com>]

(91) The early days of space flight at Missile Firing Laboratory were a
mixture of experienced engineers and scientists with seemingly crude
and brute force methods to launch missiles.
"With the launch of Redstone #1 in August 1953, the Missile
Firing Laboratory inaugurated the testing of balistic missiles. In
those days, launch procedures were unsophisticated. Albert Zeiler,
one of the Peenemunde veterans, had to decide within a split second
whether to shut off the engine immediately after ignition, basing his
decision upon the color of the flames. An off-color indicated an
improper mix of the propellants. A couple of minor delays had
occurred earlier, but on the morning of 20 August 1953 the flame
color met Zeiler's approval, and the Redstone rose."
["Moonport, A History of Apollo Launch Facilities and Operations",
Charles D. Benson, NASA History Series, NASA SP-4204, pages 7-8, 1978.
Submitted by gregb@tunfaire.den.mmc.com]

(92) The Russian Foton class Cosmos vehicle, used today for remote-sensing
and Earth photography applications, is the same Vostok capsule
that launched Yuri Gagarin into space back in 1961!
[Space Flight News, June 1988]

(93) Pad 39B, one of the two Shuttle Launch complexes, has been used very
few times. In fact, the only times it has been used previous to
Shuttle flights are:-
(1) Apollo 10 in May 1969,
(2) Skylab 2 in May 1973
(3) Skylab 3 in July 1973,
(4) Skylab 4 in November 1973
(5) The Apollo/Soyuz flight in July 1975.
[Space Flight News, August 1988]
LC39B has been used for 19 of the 31 missions since Challenger up
to STS-57, so these days it is the busiest pad. There have now been
25 launches from LC39B and 48 launches from LC39A.
[Updated 31/7/93. From jcm@urania.harvard.edu (Jonathan McDowell)]

(94) Pad 39B was first used on a Shuttle Launch in 1986 by the ill-fated
51-L Challenger flight. This contributed nothing, by the way, to
the accident itself.
[Space Flight News, August 1988]

(95) Astronaut Charlie Bolden, veteran of the 61-C/Atlantis missions in January 1986, became the first man to ride the slide-wire escape system on Pad 39B on July 8, 1988, reaching a maximum speed of roughly 55mph.
[Space Flight News, September 1988]
(Some people have already expressed doubts of this. Can anyone come up with evidence of earlier use?)

(96) Chinese SKW recoverable satellites have an interesting feature in their structure. To withstand the heat of re-entry, the Shuttle uses special tiles, and Soyuz uses a special ablative material that melts away as it gets hot. The Chinese, on the other hand, use Wood.
[Space Flight News, October 1988]
(We've heard that this wood is OAK. Does anyone have any information on this?)

(97) The only two countries which refused to telecast Neil Armstrong's moonwalk were the USSR and China.
[Space Flight News, March 1989]

(98) LENGTH WARNING - This one's quite large.....
"One evening, during the launch pad checkout of the stacked Apollo spacecraft and Saturn 5 launch vehicle for Apollo 17, one of the support crew astronauts had to enter the Lunar Module to conduct some checking and testing. The Lunar Module was nestled under the protective shield of the Apollo Command & Service Module and the streamlined launch vehicle nose-fairings.
Normally, all workers on the Saturn stack had to empty their pockets at the control points before getting close to the vehicle. Astronauts had permission to wear their standard flying suits in the Lunar Module and Command Module, as long as they kept their pockets zippered closed.
On this particular day, however, the astronaut in question had some coins in his breast pocket, which had been left unzipped by mistake. As he traversed the catwalk to the Lunar Module, he leaned over and coins spilled out. They could be heard bouncing off the structure as they fell through the Instrument Unit ring and lodged somewhere against the top of the S4B third stage that would propel them from low-Earth orbit to the Moon.
I calculate that the coins stayed there until after the Trans Lunar Injection 'burn', when the S4B put them on the same trajectory to the Moon as the CSM/Lunar Module combination."
Some day in the distant future, people are going to walk on the Moon again, and they may just find a few US coins lying in the dust!
[Bob Overmyer, Space Flight News, June 1989]

(99) With a total Height of over 75 feet, the 747/Orbiter combination has been described by some journalists as 'The World's Largest Biplane!'. Suprisingly, the Russian Antonov/Buran combination is even larger still.
[Space Flight News, June 1989]

(100) The Shuttle Carrier Aircraft must never be flown with the Shuttle aboard if the ambient temperature is less then 15 degrees Farenheit. This is because, on the type of long-duration flights the SCA typically makes when ferrying the orbiter, there is a risk of fluids within the Orbiter freezing and causing some serious problems.
[Space Flight News, June 1989]

(101) The shuttle has two possible positions or 'attitudes' available when onboard the SCA 747. The initial attitude was a 'nose up' attitude, and this was used primarily for the Approach and Landing Tests of the late 1970's. Presently, the Shuttle spends most of its time in the second available position, where it is more or less parallel to the SCA's upper fuselage.
[Space Flight News, June 1989]

(102) The Shuttle's tyres are designed to withstand temperature extremes of minus 65-degrees Farenheit to plus 200-degrees Farenheit, and are inflated, with the craft standing static on the runway, to a pressure of 327psi, with an over-inflation margin of 40psi.

(103) Apollo 1 was scheduled to actually fly in late 1966. As development of the block-1 spacecraft progressed, it became apparent that the Command Module earmarked for the Apollo 1 missions would not be ready in time for a tentatively-scheduled joint flight involving the tenth and final manned Gemini mission, Gemini 12, in late 1966. The tragic Apollo 1 fire occurred on January 27, 1967.
[Space Flight News, November 1989]

(104) It is unfortunate that NASA did not learn earlier about the fire hazard problems associated with a pure-oxygen atmosphere in the Block 1 Apollo Comand Module design. Flash fires had previously broken out in two boilerplate cabin mock-ups in September and November of 1963.
[Space Flight News, November 1989]
(104a) Also, Soviet cosmonaut Valentin Bondarenko was killed in a pure oxygen flash fire in a training simulator in March 1961. This was only revealed in the late 1980s.
[This was revealed in a series of articles in Isvestiya in April 1991 marking the 30th anniversary of Gagarin's flight. The story is available in Mike Cassutt's new book Who's Who In Space. (Macmillan: 1993, $55) which I would recommend if I could find the ISBN number.)
From jcm@urania.harvard.edu (Jonathan McDowell)]

(105) Post-accident investigations revealed that Ed-White spent his dying moments trying to open the hatch of the Apollo 1 spacecraft. The hatch was criticised as one of the major factors contributing to the death of the three astronauts in 1967. It is not widely appreciated that a revised hatch design was already under development at the time of the Apollo 1 tragedy.
[Space Flight News, December 1989]

(106) When Gus Grissom and John Young came to name their Gemini 3 spacecraft, they chose the title 'Molly Brown' after a character in a play that was running on Broadway at that time: The Unsinkable Molly Brown. NASA officialdom baulked at such an apparently flippant title and refused the astronauts permission to adopt it. Nevertheless Grissom and Young devised an appropriate patch to wear on their spacesuits: it depicted their Gemini capsule floating in the Ocean, with the name Molly Brown emblazoned above it.
All of this should have been maintained in 'low profile' mode, with the official callsign being "Gemini 3". However, the CAPCOM (Capsule Communicator) at launch, astronaut Gordon Cooper, blew Grissom and Young's cover by exclaiming, as the rocket cleared the tower 'You're on your way, Molly Brown!'.
[Chris Faulkner, Space Flight News, January 1990]

(107) On average, the Apollo astronauts spent a total of about 22,000 hours in simulator sessions, 5,000 hours in briefings, and 3,000 hours conducting hardware tests.
If one includes in this figure time engaged in related training, the eleven Apollo-series missions absorbed a staggering 84,000 hours of astronaut training and briefing time.
[Space Flight News, January 1990]

(108) On Apollo 11, the crew were worried that Neil Armstrong's leg might snag the abort handle, ending the mission in the Atlantic ocean just minutes after it had started!
[Space Flight News, January 1990]

(109) Dick Gordon, on Apollo 12, was so convinced that lightning storms would delay the launch 24 hours, that he managed to drift off to sleep during the countdown.
[Space Flight News, January 1990]

(110) At the end of Apollo 12, the hardest ocean landing was recorded - 15G! This jarred a 16mm camera from its mounting, hitting Al Bean's head.
[Space Flight News, January 1990]

(111) Many of the tests that the Mercury astronaut candidates took are now considered to have been unnecessary. Things like 'Write twenty sentences beginning with the words 'I am...', or stare at a blank piece of paper and describe what you see. Scott Carpenter, it is reputed, when stuck for his twentieth sentence, wrote in anticipation 'I am prospective Mercury Astronaut.' stating afterwards that this simple statement tipped the balance towards his selection.
[Space Flight News, January 1990]

(112) The Mercury capsule had in effect some seven miles of wire used for its control system, but had a total internal volume roughly equal to that of a telephone booth.
[Space Flight News, January 1990]

(113) The Pad Rescue Team came closest to performing an emergency rescue during a launch attempt for the maiden voyage of Discovery - mission

41-D - on June 26, 1984. At T-4 seconds, the SSME main engines were abruptly shut down. With hydrogen running free in the vicinty of the now hot engines, everyone held their breath. Then a fire was detected along the trailing edges of the orbiter's elevons, and the orbiter itself began to burn.
The crew sat tight as the water-deluge systems were activated.
A few tense moments rolled by with the Rescue Team sitting suited and waiting for a 'Go' from mission control. The fire went out, the vehicle made safe and the crew extracted after just 35 minutes.
[Space Flight News, June 1990]

(114) Of the Apollo astronauts, nearly all of them are alive. Sadly, Jack Swigert was the first Circumlunar (Apollo 13, non orbital), Ron Evans the first Lunar Orbiting, and Jim Irwin the first the first Moon Walking, Apollo astronauts to die.
[Original item was vastly incorrect. Thanks to many people for pointing this one out, and thanks particularly to jcm@urania.harvard.edu (Jonathan McDowell) for giving the correct information.]

(115) A special machine was assigned to cut some 8,500 miles of grooves into the Shuttle runway at Kennedy Space Centre. These grooves provide a means to remove the water from the runway, and provide for extra grip in the wet. (But when does the shuttle ever land whilst it's raining?). The section of the runway where the orbiter touches down was smoothed in 1988 to reduce tyre wear and wear to the brake mechanism at the point of contact.
[Space Flight News, February 1988]

(116) The Soviet R-7 (A-series, SL-1/2/3/4/6/7 or SS-6) booster was first used in 1957 to launch Sputnik 1 and it is still in active service. The first stage consists of a central core and four strap-ons. It was/is used to launch:
(a) Sputnik 1-3 (A version, no second stage)
(b) early Lunas, Vostok etc. (A-1 second stage added)
(c) Voshod, Soyus, Progress etc. (A-2 second stage)
(d) early Veneras, Mars 1, Molniya, Luna 4-14 etc
(A-2e second stage)
[Hart: The Encyclopedia of Soviet Spacecraft, 1987
Submitted by Paul.Keinanen@Telebox.tele.fi]

(117) Other than the launch escape tower, the entire Mercury-Atlas vehicle that put John Glenn into orbit will fit inside the payload bay of the shuttle (or at least it works with 1/144 scale plastic kits 8-)). I don't have any mass information handy on the Atlas, so I'm not sure whether a fully fuelled Mercury-Atlas would be under the shuttles payload mass limits though.
[Mark Grant <mark@isltd.insignia.com>]
The lift-off mass for Mercury-Atlas was 118 tons and the nominal payload capacity for low inclination shuttle launces was initially 29.5 tons. However, the Mercury-Redstone lift-off mass was about

30 tons including the escape system.
[Gatland:The Pocket Encyclopedia of Spaceflight in Color, 1967
from Paul.Keinanen@Telebox.tele.fi]

(118)A small research rocket "Aerobee" was being tested at sea in Jan 1950.
In the North Pacific and Gulf of Alaska. The Areobee was a small
liquid fuel rocket with a solid fuel booster stage. One of these at
sea (on a ship) tests "misbehaved in a suprising manor. Apparently
as a result of a leaking valve, the rocket suddenly took off 10
minutes ahead of schedule and climbed slowly and quietly by itself,
leaving the booster, unignited, in the launching tower. ... The
defective valve apparently never did fully open; calculations made as
a result of this event indicated that an Aerobee fired without
booster should go about twice as high as one that did. Of course no
Aerobee has ever been fired without a booster on purpose."
[Page 286, _Rockets, Missles, and Space Travel_ by Willy Ley, (c)1957
Viking Press. Library of Congress # 57-11123.
Submitted by wa2ise@netcom.com (Robert Casey)]

(119) Virgil 'Gus' Grissom was sadly one of the first of the original
7 Mercury astronauts to die. He perished tragically in the Apollo 1
fire of 1967.
[From Allan Bourdius <ab3o+@andrew.cmu.edu>]

(120) In 1958 the Great Red Aurora, which could be seen as far South as
Mexico, blacked out the whole of North-eastern Canada by overloading
the power lines.
[Beyond 2000, Book One, Intercontinental Publishing Corp. Ltd]

(121) The Aurora Borealis, the 'Northern Dawn', is so powerful that each
year it discharges enough energy to run the whole of the United
States for 8 to 9 years.
[Beyond 2000, Book One, Intercontinental Publishing Corp. Ltd]

(122) The 100th EVA in history (both US and Soviet, Earth Orbit and Lunar)
occurred on September 15, 1992, when Anatoli Solovyov and Sergei
Avdeyev completed their fourth EVA to install a 700kg VDU on the
Sofora Girder located on the external skin of the Kvant module.
[BIS Spaceflight, November 1992]

(123) In the process of installing the VDU on the Sofora girder, the two
cosmonauts removed what was probably the last Soviet flag still
flying, located at the top of the girder. They reported that the
flag, which had been in place since 1991, looked 'tattered'.
[BIS Spaceflight, November 1992]

(124) The androgenous docking system, called APAS, located on the Kristall
technology module, was designed to be used by reusable spacecraft
such as Buran and the US Space Shuttle. This port was first used by
Soyuz TM-16 in January 1993.
[BIS Spaceflight, May 1993]

(125) Mike Collins has written some terrific books about the spaceflight
experience. He lost the camera in Gemini 10 (and felt terrible
about it! My favourite quote of his (from Carrying the Fire):
(someone asked him what goes through his mind at 'blastoff') his
reply: "Well,you think about the fact that you are at the top of
6 million parts, all made by the lowest bidder!"
[From quagga@trystero.com aka Cheryl]

(126) The tip of the escape tower on the Saturn V/Apollo was topped by an item
called a Q-Ball made by a company called Nortronics. That's all I know
for certain. I surmise it may have been an optical retroreflector to
get an accurate position measurement at initial lift-off, but it could
have been something more exotic. Any answers would be appreciated.
[From rriemer@nas.edu]
I believe it is like an aircraft pitot tube and measures the
value of 'Q', the dynamic air pressure. (Ever heard of MAX-Q? It is
the period of ascent during which the shuttle must throttle back due
to the thickness of the air and the speed of the orbiter.)
[From jcm@urania.harvard.edu (Jonathan McDowell)]
We still don't have any solid references on this one. We would
appreciate any further information on this topic.

(127) John Young is the only astronaut to have flown 6 missions.
[One of our local NSS chapter members pointed this out, and I was
wondering if it was true. Can anyone help here?]
Update July 1993:
Young is still the record-holder with 6.
Vladimir Dzhanibekov has flown 5 now. (Soyuz 27, 39, T-6, T-12, T-13).
Active astronauts with 4 flights are Gennadiy Strekalov (NPO
Energiya), Aleksandr Serebrov (NPO Energiya/Flight Engineer, Mir
Complex), Robert Gibson (NASA Chief Astronaut), Steve Nagel (NASA
Astronaut Commander), Jerry Ross (NASA Mission Specialist), Norman
Thagard (NASA Mission Specialist), Ron Grabe (NASA Astronaut Commander),
and Story Musgrave (NASA Mission Specialist).
Musgrave will make 5 this year or early next on the HST repair mission;
Thagard is heavily tipped with a chance for the US mission to Mir in
a couple of years.
[Updated by jcm@urania.harvard.edu (Jonathan McDowell)]

(128) There was a much cheaper way of launching satellites, according to
McGill University experimenters in 1963. Developing an idea
proposed by Jules Verne, the McGill team used a rebored 50-foot-long
cannon from the battleship USS Washington to loft missiles to an
altitude of 65 miles.
By employing this technique to launch a Martlet rocket, the
McGill experimenters reckoned they could put a 50-pound payload
into orbit for less than the dollar equivalent of 18,000 pounds.
[Item from GUESSWORK that could have True or False. Below is answer.]
True, except that it turns out to be really hard to design a
useful payload that will survive the G-loads. I'm not sure if he was
at McGill, but the person who was involved in the project (HARP) was
a guy called Bull who was later involved in the Iraqi supergun and

ballistic missile projects and was recently killed. "Project HARP"
never put projectiles into ORBIT, just sent them to high ALTITUDES.
[Answered by jcm@urania.harvard.edu (Jonathan McDowell)]
(128a) Jules Verne was not the first guy to propose shooting cannonballs
into space! There's a famous illustration in Newton's *Principia
Mathematica* showing a cannon launching satellites...
[Bill Higgins-- Beam Jockey <HIGGINS@FNALV.FNAL.GOV>]

(129) A bit of trivia about Jim Lovell: He is the only US astronaut to go
twice to the moon and not land. (Apollo 8 and Apollo 13.) I guess
after Apollo13 he figured it just wasn't in the cards.

(130) The Manned orbiting Laboratory, simply a cylindrical lab attached to
a Gemini spacecraft, was to provide for 30-day missions to orbit
like the early soviet Salyut space stations. The MOL got so far as
having a mock-up launched atop a Titan IIIC rocket on November 3, 1966.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(131) The Gemini Spacecraft, mounted on the Manned Orbiting Laboratory as
if the latter were just the upper stage of the launcher, posed some
interesting problems as to how the crew were to transfer from the
Gemini spacecraft down to the cylindrical laboratory. There were
several techniques proposed to do those, namely:-
(1) cutting a hole through the heatshield for the astronauts to pass
hrough
(2) rotating Gemini so as the side hatch was attached directly,
(3) Using an inflatable transfer tunnel or
(4) Extravehicular Activity. (EVA - spacewalk.)
The one chosen was that of cutting a hold through the heat shield,
such that the mock-up that flew in 1966 with a hatch in the heat
shield - successfully recovered in the Atlantic Ocean.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(132) Charles Bassett and Elliott See, prime crew for Gemini 9, were
both killed in an aircraft accident on 28th February, 1966. Their
aircraft actually bounced off the building the Gemini spacecraft was
in, smashed into a carpark and exploded.
[Manned Spaceflight Log, Tim Furniss.]

(133) Models of the Vostok space capsule, which took the world's first
man into space, Yuri Gagarin, in 1961, was tested previously as
Sputniks 4, 5, 6, 9 and 10 and was successful 3 of these times.
[Manned Spaceflight Log, Tim Furniss.]
Sputnik was a Western name for the early Soviet unpiloted space
satellites, known at that time in the USSR generically as
Iskusstvenniy Sputnik Zemli (Artificial Earth Satellite). The
spacecraft known in the West as Sputniks 4, 5, 6, 9 and 10 were
announced at the time in the USSR as Korabl'-Sputnik 1, 2, 3, 4
and 5. Their internal names were Vostok type 1K nos. 3, 5, 6 and
(the last two) Vostok type 3KA nos. 1 and 2. [Source: Vladimir
Agapov, Moscow]. There were two other Korabl'-Sputnik launches which
failed to reach orbit, so the success rate was 3 out of 7.

[jcm@urania.harvard.edu (Jonathan McDowell)]

(134) The first orbital flight of the Mercury spacecraft, Friendship 7, was flown by John Glenn. Unkown to Glenn, a serious problem seemed to be developing on the ground when controllers noticed that sensors indicated that his heat shield was loose. Mercury spacecraft had a neat air-bag which inflated just before splash down, popping off the heat shield in the process. Controllers to Glenn to keep his retro-pack on during descent. The pack was held in place by straps, and these were thought to be able to hang onto the heat shield during re-entry!
Luckily, the effort seemed to work. Although he saw major chunks of molten metal during re-entry he splashed-down safely.
[Manned Spaceflight Log, Tim Furniss.]

(135) Lying in Mercury capsule Faith 7 in May 1963, astronaut Gordon Cooper seemed the most relaxed of all the launch team. He even fell asleep during the countdown.
[Manned Spaceflight Log, Tim Furniss.]

(136) Pavel Belayev, of the Voskhod 2 mission in March of 1965, succumbed to a long and serious stomach illness on January 10, 1970, becoming the first spaceman to die of natural causes.
[Manned Spaceflight Log, Tim Furniss.]

(137) Gordon Cooper was the first man to enter orbit twice, with a flight on Mercury-Atlas 9 (The first Mercury-Atlas flight was no 6, with John Glenn), and Gemini 5.
[Manned Spaceflight Log, Tim Furniss.]
(137a) The first man in space was Gus Grissom, as he flew on MR-4/Liberty Bell Seven in 1961 (suborbital) and on Gemini 3 in 1965. Joe Walker made suborbital spaceflights on the X-15 in 1961 and 1963, becoming the first in space twice in Jul 1963 and three times in Aug 1963. Joe Engle made his second suborbital X-15 spaceflight a couple of weeks before Gemini V.
[The X-15 flights qualify if space is considered to start at 80 km, although even if you adopt the FAA boundary of 100 km Walker's two 1963 flights qualify and make him beat Grissom].
[jcm@urania.harvard.edu (Jonathan McDowell)]

(138) Neil Armstrong and David Scott had a close brush with death in Gemini 8, when a short circuit in the Gemini control system resulted in one thruster firing continuously. The spacecraft, at one stage, was rotating at some 360 degrees per second. With the flying bedstead incident and the 10-seconds of fuel left on Apollo 11, can Neil Armstrong be considered a lucky man?
[Manned Spaceflight Log, Tim Furniss.]

(139) Lovell and Aldrin made the first observation of a solar eclipse from space on Gemini 12, the last of the Gemini flights.
[Manned Spaceflight Log, Tim Furniss.]

(140) As the docking of Soyuz 4 and 5 was achieved on January 16, 1969, the Soyuz 5 crew shouted "You raped me!". They were subsequently reprimanded for their choice of words.
[Manned Spaceflight Log, Tim Furniss.]

(141) 3 cosmonauts were launched on Soyuz 5, and just 1 on Soyuz 4. On landing, Soyuz 4 contained 3 and Soyuz 5 contained 4.
{At launch Soyuz 4 = Vladmir Shatalov, Soyuz 5 = Boris Volynov, Alexei Yeliseyev and Yevgeni Khrunov.)
Yelisyev and Khronuv were yhe first men to return to Earth in a craft other than the one in which they were launched.
[Manned Spaceflight Log, Tim Furniss.]

(142)Geoffrey Perry and his team of schoolboys at Kettering Grammar school, using their small amateur radio setup, were able to tell the rest of the world the precise point of the end of Soyuz 13 a good hour before the Soviet statement. This was at a time when the Soviets were trying to be completely open.
[Manned Spaceflight Log, Tim Furniss.]

(143) The first night-landing of a spacecraft came with the semi-emergency landing of Soyuz 15 in 1974.
(I think this is so. Can anyone verify this?)

(144) Length Warning....
The joint Apollo-Soyuz mission was a success, but disaster struck the American crew as they descended towards the recovery ship USS New Orleans. Communications difficulties distracted Brand and he forgot to operate the two Earth landing system switches which would deploy the parachutes and deactivate the thursters. When the drogue parachite did not come out, Brand manually commanded it to deploy, but the swinging of the psacecraft caused the still-armed thrusters to fire to correct the oscillations. Stafford noticed this and shut them down, but by then the thrusters' nitrogen tetroxide propellant was boiling off and entering the cabin via a pressure-relief valve. A significant amount of the highly poisonous gas was drawn into the capsule and the astronauts started to cough and choke. The command module then hit the water 'like a ton of brocks' as Stafford described it, and turned upside down. Stafford grabbed the oxygen masks from a locker but by the time he reached Brand the command module pilot was unconscious.
None of the astronauts was killed but the fast-acting gas had turned their lungs white and blistered, and during their recuperation a shadow was found on one of Slaytons Lungs. Fearing cancer, the surgeons decided to operate but found that it was a benign tumor. Had the shadow been found before the flight, Deke Slayton's grounding would most probably have held over and prevented him from making any flight at all.
[Manned Spaceflight Log, Tim Furniss.]

(145) Deke Slayton was the only original Mercury seven astronauts not to make a Mercury flight.
[Manned Spaceflight Log, Tim Furniss.]

(146) The back-up spacecraft for the Apollo-Soyuz flight (Apollo 18 and Soyuz 19) was used on the Soyuz 22 flight, with the androgynous docking equipment replaced by a photography canister.
[Manned Spaceflight Log, Tim Furniss.]

(147) It was the British who developed the 'minimum' satellite launchers of the 1950's. They found that a tank with hemispherical ends, but otherwise with no structural members, when pressurised could act as a load-bearing structure. A series of developments and cancellations in the US finally resulted in the development of the Atlas, with similar developments in the USSR. The astronauts launched on the Atlas in the Mercury project commented that the Atlas felt like a big wobbly baloon just prior to separation from the booster in orbit.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(148) The Gemini spacecraft needed an object to aim for in practising rendezvous techniques necessary for the Apollo missions. They used special Agena Docking Adaptor launched by an Atlas. The Adaptor was essentially a modified Agena stage. The adaptor to be used on Gemini 9 was different to the others, and unfortunately failed to release it's nose shroud correctly, resulting in the renowned 'Angry Alligator' pictures of the two half sections of the nose cose apart but unwilling to move any further.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]
(148a) The GATV (Gemini Agena Target Vehicle) was an Agena D with a TDA (Target Docking Adapter) on the front. But the GATV for Gemini 9 fell in the ocean on launch. It was replaced by a backup called the ATDA (Augmented Target Docking Adapter) which was NOT a modified Agena - it was just the TDA with a cylindrical back end to mate it straight to the Atlas.
[jcm@urania.harvard.edu (Jonathan McDowell)]

The next few items, from 149 to 160, come from the Space Shuttle Main Engine Incredible Facts sheet put out by Rockwell International Rocketdyne Division. This was kindly forwarded to us by

(149) Fifty times a second, the SSME electronic controller evaluates itself and the engine and then adjusts the engine valves to obtain peak performance during the Shuttle Orbiter's launch and ascent.

(150) Although not much larger than an automobile engine, the SSME high-pressure fuel turbopump generates 100 horsepower for each pound of its weight, while an automobile generates about one-half horsepower for each pound of its weight.

(151) Each of the 122 high-pressure fuel pump turbine blades, about the size of a half-dollar, generates 700 horsepower while spinning at 37,000 rpm.

(152) Rocketdyne's Space Shuttle Main Engines operate at greater temperature extremes than any mechanical system in common use today. The fuel,

liquid hydrogen, is -423 degrees Farenheit, the second coldest liquid on Earth, and when burned with liquid Oxygen, the temperature in the engine's combustion chamber reaches +6000 degrees Farenheit - higher than the boiling point of iron.

(153) The SSME high-pressure fuel turbopump main-shaft rotates at 37,000rpm compared to about 3,000rpm for an automobile engine operating at 60mph. (roughly 110km/h)

(154) The maximum equivalent horsepower developed by the three SSME's, is just over 37 million horsepower.

(155) If water, instead of fuel, were pumped by the three Rocketdyne Space Shuttle Main Engines, an average family-sized swimming pool could be drained in 25 seconds.

(156) One Rocketdyne Space Shuttle Main Engine generates enough thrust to maintain the flight of 2.5 Boeing 747 airliners.

(157) Discharge pressure of an SSME high-pressure fuel turbo-pump could send a column of liquid Hydrogen 180,000 feet into the air.

(158) The energy released by three of Rocketdyne's Space Shuttle Main Engines is equivalent to the output of 23 Hoover Dams.

(159) During launch and ascent, the three SSME's empty the half-million gallon exteranl tank in about 8.5 minutes.

(160) Even though Rocketdyne's Space Shuttle Main Engine weighs one-seventh as much as a locomotive engine, it's high pressure fuel pump alone delivers as much horsepower as 28 locomotives, while its high-pressure oxidizer delivers the equivalent horsepower for 11 more.

(161) The ACTS - Adavanced Communication Technology Satellite, launched on STS-51, will provide the largest transponder throughput ever - 1.0 gigibits per second (GBPS)
[STS-51 Payload Handbook]

(162) The space-suits worn by the original 7 Mercury astronauts were individually tailored to each astronaut. In Schirra's words they required "More alterations than a bridal gown."
[Life in Space, ISBN 0-8094-4900-5]

(163) The 27-year-old test pilot, Yuri Gagarin, of the Soviet Air Force, was jumped from senior lieutenant to Major just before his memorable Vostok flight.
[Life in Space, ISBN 0-8094-4900-5]

(164) Even though Gemini was by far a larger and more sophisticated version of Mercury, A simplified sequencing system - and especially the elimination of the scape tower - reduced the number of relays from 220 in Mercury to 60 in Gemini.
[Life in Space, ISBN 0-8094-4900-5]

(165) Oddly, while everything but metal was badly burned during the tragic
Apollo 1 fire, a portion of the flight plan survived with only a few
pages singed.
[Life in Space, ISBN 0-8094-4900-5. Page 139, you can see the paper.]

(166) Each of the F-1 engines, used in the first stage of the Saturn V
Apollo moon launcher, was about as big as a two-and-a-hald-ton truck,
and used three tons of propellants a second.
[Life in Space, ISBN 0-8094-4900-5]

(167) The Saturn V absorbed the know-how and energies of 325,000 people
in 12,000 firms. As tall as a 36-story building, it had 11 engines.
The five engines that powered the first stage alone were designed to
develop 160 million horsepower, the capacity of 86 Hoover Dams.
[Life in Space, ISBN 0-8094-4900-5]

(168) The journalists recording the historic launch of Apollo 11 had to wait
some 15 seconds for the noise of the Saturn V ignition to reach them.
By that time, the rocket had already risen silently into the air.
[Life in Space, ISBN 0-8094-4900-5]

(169) When Soyuz 19 was launched in July of 1975, for the Apollo Soyuz
Test Project, the Soyuz was launched from the same pad that had
launched Sputnik some 18 years before.
[Life in Space, ISBN 0-8094-4900-5]

(170) NASA investigated at some stage the possibility of flying Columbia
unmanned so that they could remove the back-log of payloads waiting
to reach orbit. NASA had 13 old-specification SRBs in storgae at
the time. Unfortunately, this approach proved unfeasible.
[Space Flight News, September 1988.]

(171) The Mobile Service Structure (MST) at Cape Canaveral LC-40 is believed
to be the world's largest moving building. The 23 story (206 feet)
structure weighs 11.4 million pounds and can move at 50 feet/minute.
LC-40 is used to launch Titan-IV vehicles.
[gregb <gregb@tunfaire.den.mmc.com>]

(172) Sometimes even rocket technicians can overlook the obvious.
Case in point: Alan Shepard's Mercury-Redstone suborbital flight.
Because the expected duration of the flight was 15 minutes, none of
the engineers thought that Shepard would have to "relieve his
bladder" during that time. However, Shepard was strapped into the
Mercury capsule some 3 hours or so before liftoff. After a couple
of hours sitting on his back, Shepard felt the urge to go in a bad
way and asked for "permission to relieve his bladder." After some
debate, the engineers and medical team decided that it was OK for him
to pee in his spacesuit. And this is what he did.
I also suspect that NASA didn't want any negative publicity by
cancelling the launch. The newspapers would have had a field day:
(e.g. "Shepard has to pee, launch cancelled")
Starting with Gus Grissom's flight, strap on urine receptacles
were provided to the Mercury astronauts.

[Tom Wolfe, "The Right Stuff" -
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(173) Since September 1989, Mir has been occupied by cosmonauts continuously
without a break. This date would have been February 1987 except for
a break between Apr 27 and Sep 5 when Mir was left unattended for
awhile. In the future, we may look back and say that Sep 5, 1989,
was the last day that ALL of mankind was residing on Earth!
[Idea from Joe Dellinger <joe@montebello.soest.hawaii.edu> Dates and
Information from jcm@urania.harvard.edu (Jonathan McDowell)]

(174) The current shuttle flight computers are Quad redundant with a fifth
computer as a backup. They are AP-101S machines and were designed in
the mid 80's. Relatives of this computer also fly on the B-1, F-8,
AC-130 and B-52.
[Wingert@vnet.IBM.COM (Bret Wingert)]

(175) "every passing year brings the Solar System forty-three thousand
miles closer to Globular Cluster M13 in Hercules-- and still there
are some misfits who insist that there is no such thing
as progress." RANSOM K. FERN
[From burt@techbook.com (Burt Keeble)]

(176) Here's another bit of trivia for you: Neil Armstrong and (I think)
David Scott were in rather a pickle during their Gemini 8 mission
when a thruster continued firing after instructed to stop, putting
the spacecraft in a spin. I believe the mission was then curtailed
because of the lack of adequate thruster propellant for on-orbit
maneuvering and re-entry positioning. Evidently American television
audiences complained at the news reports interrupting the show they
were watching with news of this real-life space drama.
The show? Star Trek.
[From quagga@trystero.com]

(177) The top age set for the intake of the new group of astronauts for
the selection of the original Mercury Seven astronauts was set
at 40. The maximum height was set at 5ft, 11in and the weight
limit was 180lb.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(178) The first check of Military Test Pilot records revealed that 508
test pilots met the basic astronaut requirements. With suggestions
from commanding officers, this was reduced to 110. Further, with
the help of trainers and instructors, who'd brought these men up
to flight status, this was further reduced to 69. These people were
all invited to apply, but only 32 volunteered. These all went on
to undergo physical examinations and were reduced to 14. The selection
of the final 7 came at 2PM, April 9, 1959.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(179) John Glenn was the only Mercury astronaut with Red Hair, all the
others had brown hair.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(180) Alan Shepard was the tallest Mercury Astronaut at 5ft 11in, and
Gus Grissom the shortest at 5ft 7in.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(181) Gordon Cooper was the Youngest Mercury astronaut at 32 years of
age at selection, and John Glenn the oldest at 37.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(182) Alan Shepard was particular fond of Jos(233) Jim(233)nez, the brainchild of
comedian Bill Dana. Al found Jim(233)nez brand of humour such a handy
device for relaxing the troops when tension was building up before a
flight that he once arranged for a tape of some of Jos(233)'s dialogue
to be played in the Mercury control centre during a practice run.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(183) Alan Shepard was so fond of his white Corvette sports car that he
would often drive the 800miles from his home town to Cape Canaveral
rather than fly.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(184) The inside of the Apollo Command Module, on lift-off of the Mighty
Saturn V on Apollo 11, was quiet enough to listen to the radio!
[LIFTOFF - By Michael Collins.]

(185) The guidance experts had to aim the Apollo spacecraft some 40 degrees
of arc ahead of where the Moon was positioned at the time of launch.
[LIFTOFF - By Michael Collins.]

(186) A small controversy erupted from the Apollo 8 and 10 flight crews
who went to the moon but never actually landed. Apollo 8 reported
that the Moon was gray, while Apollo 10 claimed it was Brown.
[LIFTOFF - By Michael Collins.]

(187) The area picked out for the landing of Apollo 11 was expected to
be smooth - but instead it was littered with boulders the size of
Volkswagons.
[LIFTOFF - By Michael Collins.]

(188) The albedo of the Earth is some 4 times greater than that of the Moon.
[LIFTOFF - By Michael Collins.]

(189) Mike Collins bet Neil Armstrong a beer that they would land in the
Ocean a splash upside-down once they hit the water. The astronauts
were required to throw a breaker that released the parachutes, but
at the moment of splash down their hands are jerked away, and the

craft slowly turned over.
[LIFTOFF - By Michael Collins.]

(190) The first message received by the Test Pilots as to their impending call for Astronaut service went as follows:-
"You will soon receive orders to OP-05 in Wasshington in connection with a special project. Please do not discuss the matter with anyone or speculate on the purpose of the orders, as any prior identification of yourself with the project might prejudice that project.
[We Seven - by the Astronauts Themselves, Simon and Schuster, New York, 1962.]

(191) One of the early launches of the Space Shuttle (I don't recall the number) was "scrubbed" because one of the five onboard computers didn't come up "in sync" with the others. The interesting thing is that a couple of days later one of the largest solar storms ever observed occurred (with the resulting aurora borealis being visible as far south as Dallas, Texas). If it weren't for the computer "glitch" that prevented the launch, the Shuttle would have had to make an emergency landing due to the radiation levels from the storm.
[From jones%azterra@sj.ate.slb.com (Clark Jones)]
{Awaiting the finer details for this one.)

(192) Walter Schirra helped start out the Sidewinder missile program at the Navy Ordnance Station at China Lake, California. He actually got to fire the first sidewinder missile at a drone target to see what would happen. Flying an F3D night fighter, right after he let the Sidewinder loose it went a little haywire and started a loop which would chase his plane rather than the drone. So he made a fast loop, trying to stay behind it. It succeeded, but his flight engineer had a bad case of the 'clanks', which is pilot talk for the 'shakes.'
[Walter M. Schirra, We Seven, 1962]

(193) The first two Mercury spacecraft carried with them some extra equipment to help the rescue crews find them in the ocean - a chaff dispenser and an underwater bomb.
[Donald K. Slayton, We Seven, 1962]

(194) One of the concerns of the Mercury astronauts was to know exactly what all the noises were as they were preparing from launch. They could hear absolutely everything, from moving the gantries outside to hearing the pipes creek as the fuel is loaded, the launcher shimmies as the engines are gimballed, and the rush of water on the pad just before ignition.
[Donald K. Slayton, We Seven, 1962]

(195) 30 seconds after the boosters of the Atlas launcher are dropped, the launcher for the Mercury flights, the Atlas was programmed to go into a 14 degree pitch back towards the Earth.
[Donald K. Slayton, We Seven, 1962]

(196) It was also apparent that on some occasions when the boosters dropped away from the Atlas launch vehicle that the Mercury capsule would be enveloped in flames for a second or tow. Something the astronauts needed to know so that they would not panic if this happened to them...
[Donald K. Slayton, We Seven, 1962][

(197) John Glenn, whose capsule was picked up by a destroyer while he was still inside, tried to crawl out through the top hatch of the Mercury capsule but found it easier to blow the hatch and come out that way. He did this on the deck of the destroyer and in the process badly bruised his knuckles - one of the prime pieces of evidence that backed up Gus Grissoms story on the mysterious hatch-blow that resulted in the loss of Gus's capsule.
[Donald K. Slayton, We Seven, 1962]

(198) Scott Carpenter, remembering that Gus Grissom lost his capsule when his side hatch blew, and that John glenn got hot staying inside his capsule, elected to go out through the top hatch and take his life raft with him. With perhaps the thinnest hips of the group, he found it fairly easy.
[Donald K. Slayton, We Seven, 1962]

(199) A survival knife was specifically contracted for the Mercury astronauts. They each had their own, but another was taped to the hatch on some of the flights. It was one of the strongets knives ever made, being hand forged and hand tempered from high grade Swedish steel that was so sturdy that it could be used like a chisel to cut through bolts.
[Goodon Coo[er Jr, We Seven, 1962]

(200) Al Shepards Mercury Capsule was the only capsule not to have a window through which he could admire the images of his home planet..
[Goodon Coo[er Jr, We Seven, 1962]

(201) Since the body tissue of pigs is very similar to that of humans, they strapped a live pig in a special contour couch - made the same way as the special moulded couches for the astronauts, to prove that the moulded couch would enable the astronauts to withstand higher impact G-loads when hitting the water than if they had a normal, cushioned couch.
[John Glenn, We Seven, 1962.]

(202) One of the simplest tools that the Mercury astronauts took with them on their flights was a little rod known as a 'Swizzle Stick'. It was used basically as an extension of their fingers if they had to pressurise their suits and couldn't reahc one of the switches...
[John Glenn, We Seven, 1962.]

(203) The highest G-load experienced by a human was when a Navy Lieutenant by the name of Carter Collins tested his own speciallu moulded Mercury couch, taking a load of 20.4G's for six seconds. The doctors who examined him revealed that some tiny blood vessels under the

surface of the skin had ruptured, but that this was not a serious injury and did Collins no serious harm.
[John Glenn, We Seven, 1962.]
(Can anyone check on the 'Highest load' statement, I mean that was 30 years ago!]

(204) The gloves for the Mercury astronaut space suits were woven in a special way. Nearly all the fingers were woven curved, so that the astronauts to grasp things even when the suit was pressurised, except the middle finger on the left hand, which was woven straight so that the astronauts could still get at the little recessed buttons on the control panel.
[John Glenn, We Seven, 1962.]

(205) The Mercury astronauts discovered that the helmets that they wore fitted best when they had a five-day-old haircut. John Glen refined this a bit and had his hair trimmed every three days before his flight.
[John Glenn, We Seven, 1962.]

(206) Deke Slayton's spacesuit was the only one made different due to one small complaint. They changed one of the zippers to one side, and split it into two separate zippers becasue it pressed right against Deke's ADam's apple and was afraid that it might be rather painful for him on the flight.
[John Glenn, We Seven, 1962.]

(207) The atsronauts had a name for the two different types of G-forces they experienced whilst training on their large centrifuge. When thrust back into their sieat, they called it Eyeballs in, and when thrust out of their seat, with a negative G-force, they called it, appropriately, eyeballs out.
[John Glenn, We Seven, 1962.]

(208) The main way the pilots could generate a zero-gravity environment was to go in a high parabolic flight. The way in which they kept the zero-gravity stable was to ignore the instruments and watch a little bright orange golf-ball on the end of a short nylon tether. They had to try and keep the golf-ball right in front of their face...
[Scott Carpenter, We Seven, 1962.]

(209) The Space Suit for the Mercury astronauts had a special neck-seal that they would use only if they were planning to dive into the ocean once they had returned. The seal prevented water from entering the suit through the helmet-ring and cause the astronaut to sink.
[Alan Shepard, We Seven, 1962.]

(210) The most dramatic failure of the Mercury program came in the testing stages when a Redstone and mock-up capsule were ready for launch. At "zero", the Redstone engines started and shut down straight away. In a fraction of a second the escape tower mounted on top of the capsule took off in a rush of flame, a parachute came out of the canister

where the tower had stood, and another parachute came out again in
quick succession.
It had turned out that the Mercury capsule had coped with the
Redstone failure precisely, as the escape tower took off because of
the lack of G-forces, and the parachute came out due to the
altimeter detecting that it was below the poitn where it should
have been activated on descent...
[John Glenn, We Seven, 1962.]

(211) The Mercury capsule, in the episode in item 210 above, began emitting
the radio tracking signal like it should, and the two Navy P2V
tracking planes 120miles away detected the beacon and started to
home in on the launch pad.
[John Glenn, We Seven, 1962.]

(212) Ham, the Monkey that tested the Mercury capsule out for the
astronauts, himself did not have an uneventful flight. First of
all, an oxygen valve had jiggled loose during launch, nd kept the
interior of the capsuel form pressuriZing. Fortunately the chamber
that enclosed HAM worked fine and it kept him sealed up and safe
during the flight. Also, the Redstone booster gave him an extra
1000 mph of speed. The escape tower detected th9is and gave him a
further 800mph. As a result the capsule went 130miles further
down range than it was supposed to.
[John Glenn, We Seven, 1962.]

(213) On the Morning of Alan Shepard's launch, the doctors noted that the
nail on the 4th toe of his left foot was coming loose because
someone had accidentally stepped on him, and he was peeling
slightly from a recent sunburn.
[John Glenn, We Seven, 1962.]

(214) John Glenn left a little note for Alan Shepard in the Mercury capsule
for when Alan would enter to make his flight. It said "No handball
Playing in this area."
[John Glenn, We Seven, 1962.]

(215) The lanyard they used on the hatches of the Mercury capsule to
detonate the explosive bolts was only 42 inches long. But the
explosive charges were enough to through the capsule hatch a
distance of 20 feet. The solution was to use some soft iron coils
which linked the hatch to the capsule sill.
[Virgil Grissom, We Seven, 1962.]

(216) The capsule clock for the 2nd Merucry spacecraft suborbital flight
actually rusted out, requiring a replacement quite rapidly even
though there were practiaclly no clocks anywhere to be found.
[Virgil Grissom, We Seven, 1962.]

(217) A crack was painted on the side of the Liberty Bell 7, the capsule
for Gus Grissom's flight. many people joked that it was the crack
the caused the capsule to sink after the flight...

[Virgil Grissom, We Seven, 1962.]

(218) During reentry the capsule would slow from 17,500 mph to 270 mph and reach a temperature of 9.500 degrees Farenheit - close to the temperature of the sun.
[John Glenn, We Seven, 1962.]

(219) The speed of the Mercury capsule meant that the astronauts would experience sunrise and sunset some 18 times quicker than we do on the surface.
[John Glenn, We Seven, 1962.]

(220) It was of no concern to John Glenn that his capsule was designated as number 13...
[John Glenn, We Seven, 1962.]

(221) The flotation collar, installed on the outside of the Mercury capsule by frogmen after splash-down, was first used on the third mercury flight, the first orbital flight, of John glenn.
[Malcolm Scott Carpenter, We Seven, 1962.]

(222) The Mercury controllers initially insisted that should the astronauts lose voice contact with the ground that they shoud immediately abort the flight. The astronauts argued this point when they proved that they could communicate with the ground almost as effectively using morse code.
[Malcom Scott Carpenter, We Seven, 1962.]

(223) It was initially disconcerting for John Glenn, siiting 74 feet above ground on the Atlas booster. It would sway slightly in a heavy gust of wind. In fact, he stated he was able to set the whole structure rocking himself, just be moving back and forth in the couch.
{John Glenn, We Seven, 1962.]

(224) One Mercury test flight resulted in the Atlas booster exploding during the period of maximum aerodynamic pressure, but the Mercury escape tower system worked just fine and the capsule came down in such fine condition that the engineers were able to use it again on another test flight.
Is this the first instance of reusability?
[John Glenn, We Seven, 1962.]

(225) A special instrmument was developed for the Mercury flights called an EXTINCTIONSPECTROPHOTOPOLERISCOPEOCCULOGRAVOGYROKYNETOMETER, but was called 'Voas meter' for short after Dr Robert Voas who developed it.
[John Glenn, We Seven, 1962.]

(226) Just 24 seconds before John Glenn made a transmission saying that he felt sections of his retro-packet breaking away during re-entry, Al Shepard had started to recommend to Glenn that he jettison the retro-pack as soon as the G's build up to 1 or 1.5. Glenn did not receive the message, however. The communication black-out had

already set in.
[John Glenn, We Seven, 1962.]

(227) The men aboard the Noa were so pleased that it was their ship that and not the aircraft carrier that had picked John Glenn and his capsule out of the water that they amde him a honorary member of the crew and presented him with a fifteen-dollar chack as the February winner of the 'Sailor of the Month" contest. He then endorsed the check over to the ship's welfare fund.
[John Glenn, We Seven, 1962.]

(228) After the Mercury flight, John Glenn was asked to walk on a straight rail laid on the floor in order to check his balance. Colonel Chuck Yeager, the famous test pilot who first broke the sound barrier, suggested later that this test only proved that John Glenn had been brought up near some railroad tracks.
[John Glenn, We Seven, 1962.]

(229) One of the forms that John Glenn was required to fill out after the flight asked the question "Was there any unusual activity during this period?" to which Glenn answere "No, just a normal day in space."
[John Glenn, We Seven, 1962.]

(230) Poker Flat is the only university-owned sounding rocket range in the world. The 5,200-acre facility is located about 35 miles from UAF's main campus in Fairbanks. The range launched its first rocket in 1969.
[From NSMCA@acad3.alaska.edu]

(231) When the DCX made it's inaugural hop on (date ?) in 1993, it's touchdown was only 6 inches away from the predicted target.
[sci.space, August 1993]

(232) While watching the cameras for the launch, we were watching the Beanie cap (the cap on the top of the ET (External Tank). When it lifted in term count, it revealed a salamander underneath it. Upon seeing the sun, it scurried into the ET GO2 vents (at the very top of the ET), and a couple of minutes later the shuttle lifted off. I am sure it was quite a ride until the atmosphere ran out...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(233) In 1991 Dr. Helen Sharman became Britain's first person in space, spending eight days on board Russia's MIR space station, conducting a range of experiments and other work.
Selected from over 13,000 applicants, after listening and responding to a radio advertisement, Helen spent 18 months in training for the Juno mission. A Chemical Engineer by profession, Helen Sharman is considered a role model by anybody who strives for achievement, values, training, relies on teamwork, and believes that the sky is the limit !
[From charles.radley@pcohio.com (Charles Radley)]

****
****

* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
****
****

(1) Grissom had a reputation for speaking Army Creole. Lines like
"F***ing A, Well Told, Bubba". It was a factor in the vote for
Sheperd being the first man up. The other astronauts were kind of
concerned about Grissoms First words.

(2) Weightless intercourse - "Sex in Space" - is said to have been
accomplished in both the US and Soviet/Russian Space programs. This
has been said to have happened not once but as much as 7 times!
[The Three Dolphin Club, G Harry Stine, Analog Science Fiction/
Science Fact.]

(3) In terms of complexity, it is interesting to gain a comparison of the
Shuttle and Apollo systems. It has been estimated that the whole
Service Module is only the equivalent of each one of the Orbital
Maneouvering Systems on the rear of each orbiter.

(4) In 1969, when Donald Buchanan - KSC's chief of engineering - travelled
to London to accept the Diamond Jubilee trophy of the Royal
Automobile Club for "The Outstanding Contribution on the field of
Automotive Transport", he carried with him a small scale model of
the crawler vehicle (He was accepting the award because of the Crawler
Trans-porter). On seeing the model in Buchanan's suitcase, the
customs officier on duty at the airport - obviously unaware of the
real-life crawler - earnestly enquired if he was a travelling
salesman selling farm machinery!

(5) Von Braun was one of the most far-sighted men in human history. The
rocket he designed for the V-2 worked perfectly, he told a friend
when the first V-2's hit London, except that they landed on the
wrong planet!
[Life in Space, ISBN 0-8094-4900-5]

(6) Gemini 3's lift-off was reportedly so smooth that neither of the
astronauts felt anything - the starting of the mission clock
on the instrument panel alerted them.
[Life in Space, ISBN 0-8094-4900-5]

(7) One of the CapCom's during the recovery of (I think) Apollo 15 said
(roughly): "we can bring these things down in Clear Lake if we want".
[aws@iti.org (Allen W. Sherzer)]

(8) I think it was an interview with Sally Ride when someone asked her
about the underclothes that she wears in space. She said that she did
not bother wearing a bra in space!
[From wepaim@itwol.bhp.com.au (Mark Paine)]

(9) There is also another story of the original white ET's. Apparently the white (for some reason only white and not the current brown / orange ones) attracted woodpeckers. They LOVED the tank, and they loved pecking on it. Probably not a bright idea, but since they are birds...
[From HOLLIS@TITAN.KSC.NASA.GOV]

****
****
* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager to try out the (older, also expensive) toilet. I think it was Crippen. Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!". There is a fan in it to suck down the contents. Apparently the fan was verified to be working correctly (i.e. it spun up) but nobody ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute compartment after splashdown, scientists ended up using a product from a drug store. I saw this on a space travel special. The story goes something like one of the project scientists sons was up with a cold. So, the scientist mixed up a cold remedy gel (added water to a powder) for his son late one night. This gave him the idea. When itemizing the inventory for the project budget, they used the drug store product code and used a backwards spelling of the product name. Of course, they adapted it a bit for the spacecraft, but the same principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting in the launch pad gantry. Does anyone know if this is true and if so which launch ? (According to the guide on a KSC coach tour - probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

The next three were from a TRUE or FALSE quizz in Space Flight News April 1989 issue. The answers weren't published (as far as I can find) so I am including the items here so that someone else can tell us which are true and which are false.

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to launch leeches - 'the world's most ideal space travellers' - on an extended flight.
"Give them a bloody meal before they go, and they'll need nothing for a year-and-a-half!" was how one scientist characterized the suitability of leeches for space travel. Posing no feeding or

waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(8) One of my favorite stories (though you should probably check out the
veracity of it) is in regards to the Apollo program. Several of the
early launches were on Little Joe II rockets, which were solid fuel
boosters, and were designed mainly to test the escape tower system.
The Little Joe II rocket was described by one NASA official as being
"the most reliable booster we've ever built". On the last such flight,
the fuel charge in the Little Joe II shattered several seconds before
the scheduled test of the escape tower, creating a true emergency for
the escape tower to handle (the escape tower worked perfectly). The
Little Joe II launches, by the way, took place at White Sands Missle
range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(9) Is there any truth to the rumor that Dick Nixon ordered all plans for
the Saturn V destroyed so that they wouldn't fall into the hands of
the Soviets?
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(10) At one time, the Gemini space craft was going to land on land rather
than on water, with a rather bizzare inflatible "hang-glider" instead
of parachutes. (I remember having a NASA publication when I was a

kid that had drawings of this configuration. It even showed the
storage compartment for the inflatible wing running between the two
hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
(Can anyone come up with some sources for backing up/refuting the last
three items?)

****
****
* *
* Trivia List Submission Policies and Guidelines *
* *
****
****

The policies dictating what should be included in this file are
subject to change at any notice, but will hopefully remain solid around the
following short guidelines:-

(1) Comparisons of Space Hardware to common concepts or everyday
objects. (eg the list of interesting facts on the strength
and capabilities of the Space Shuttle Main Engines)
(2) Similar to No.1, comparisons of modern hardware to older hardware
(eg how a Mercury capsule could fit inside the engine shroud
of the F-1 engines on the Saturn V)
(3) Plans of what different space agencies were once planning but
have since cancelled.
(4) Stories of lost opportunities from funding cuts.
(5) Personal accounts of what 'Human Space Travellers' (Cosmonauts,
Astronauts, Euronauts etc) have said or done that are
suprising, astounding or otherwise interesting in some way.
(6) Miscellaneous pieces of trivia with a sufficiently high interest
quotient. (ie, something likely to lift the eyebrows of
perhaps just a few people and warrant a real 'Oh WOW, I
didn't know that!'.
(7) Rumours of a justifiable nature. This will need a separate
section to be included in the list (To be set aside from
trivia FACTS).

Policy on excessive rumours and untruths:-

As it is planned for this list to be updated regularly, additions to
this file will hopefully come at a regular rate. Posting to newsgroups
sci.space, sci.space.shuttle, sci.astro and perhaps the new space group of
the ham.radio collection of groups will hopefully arouse enough regular
interest to keep this list growing.
Additions will then undergo minor scrutiny before inclusion in the
list. If the moderator or any other person on the net have any reason to
believe that a certain item of trivia may be false, then the item will be
included in an 'Un-justified' group in this list. The owner of the
information may then be asked to include some sort of evidence of information
- whether it be references to works of other people, or working-out from

scratch - then this will be investigated to determine whether the item has
been doctored in any way.
We hope to have our facts as found on record in at least one place
around the globe, and our rumours as heard by at least a number of people.

****
* Submissions: *
****

For these reasons, we have a rough guideline for the format of
submissions to this list, namely:-

(1) In the subject header for the message, please include somewhere
'Submission for Trivia List'. You may include a brief title or whatever
if you can squash it in. No need for a summary unless you are just
accustomed to doing them.
(2) FACTS: Please include some source information for your
information. This sort of thing usually depends on the circumstance. Cost
comparisons etc would prefer sources for values, Size comparisons would
prefer measurements and where they were quoted from etc. If the trivia
isn't yours, then let us know from where it came.
(3) RUMOURS: It is hard to justify this one, but let us know if
it is complete hear-say or if it is based on some report issued by
whatever agency on the efficiency of whatever you think appropriate. Just
give us some background - if you could.

It's not like we'll be critical or anything - beggars can't be
choosers - but it would help in the final organisation of everything if
these simple guides were included.
We'd like to include that, if the work gets hard, we'll issue a
semi-formal-submission-format so that we can semi-automate the process.

****
* UPDATE LOG: *
****

28/6/93 - Started the list for the first time, created the initial policy
guidelines and posted the request for more trivia information
to newsgroups sci.space, sci.space.shuttle, sci.astro and
rec.radio.amateur.space. (It may prove necessary to remove
this last group from the list if any of their group mentions
that it is an inappropriate item for their group. The initial
posting is to perhaps include some interesting trivia from
their own personal experience, so for the moment it is to be
included.)
Only items so far included are those from the Trivia Section of the
'Newcastle Space Fronter Society Update' - a privately
distributed newsletter of the Newcastle chapter of the
National Space Society of Australia, the Australian Network
of Chapters of the National Space Society. (That's a lot to
get down into one paragraph!)

17/7/93 - Changed the layout of the List by basically inverting the
submission information - from top to bottom to make it
better to read. Also, have received suggestions of posting
only an updated list, but rather I think I'll include a list
of changes in the first few lines, and people can still
read through the rest if they've never seen it before.
Included new ones from Shuttle by Nigel MacKnight, and
also from the BIS Spaceflight Magazine.

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

126. NOAA-13 (was Re: APT-Satellites: Report AUG 21, 1993)

Newsgroup: rec.radio.amateur.space
Date: 1993-08-23 21:01:30 UTC
From: trier@odin.ins.cwru.edu
Message-ID: <25bb7a$29v@usenet.INS.CWRU.Edu>
Source record: 28832

In article <1993Aug23.071037.29295@gmd.de>,
Peter Henne <peter.henne@gmd.de> wrote:
>NOAA-13: APT 137.62 On
>
>*NEW* NOAA-13 transmits vis-channels 1 and 2. IR-Sensors
>shall be activated on AUG 26 according to info from
>wxsat-mail-list, ...

I just read on Clarinet that NOAA-13 had been lost and an inquiry
was being conducted. Is this information correct? Was the Clarinet
article wrong?

Stephen

--
Stephen Trier (trier@ins.cwru.edu - MIME OK)
Network Software Engineer
IRIS/INS/T
Case Western Reserve University

127. Re: NOAA-13 (was Re: APT-Satellites: Report AUG 21, 1993)

Newsgroup: rec.radio.amateur.space
Date: 1993-08-23 21:08:06 UTC
From: trier@odin.ins.cwru.edu
Message-ID: <25bbjn$2t2@usenet.INS.CWRU.Edu>
Source record: 28833

In article <25bb7a$29v@usenet.ins.cwru.edu>,
Stephen C. Trier <trier@odin.ins.cwru.edu> wrote:
>I just read on Clarinet that NOAA-13 had been lost and an inquiry
>was being conducted.

(Uh, oh... following up to my own message)

The Clarinet article said NOAA-13 was lost Saturday morning. The summary
probably predates that. Never mind my confusion.

Stephen

--
Stephen Trier (trier@ins.cwru.edu - MIME OK)
Network Software Engineer
IRIS/INS/T
Case Western Reserve University

128. LEO WX Sat Freqs

Newsgroup: rec.radio.amateur.space
Date: 1993-08-24 02:17:32 UTC
From: rlong@magnus.acs.ohio-state.edu
Message-ID: <25btns$o2m@charm.magnus.acs.ohio-state.edu>
Source record: 28834

```
Newsgroups: radio.amateur.space
Subject: LEO WX Sats Freq.
Summary:
Followup-To:
Distribution: usa
Organization: The Ohio State University
Keywords:

Can anyone tell me if the LEO weather satellites transmit
on 1691 MHz or thereabouts?

A short list of the existing satellites and their frequencies
both VHF and 1.6 GHz would be much appreciated.

Thanks.

Ron

Please reply to: w8gus@amsat.org
```

129. Re: NOAA-13 (was Re: APT-Satellites: Report AUG 21, 1993)

Newsgroup: rec.radio.amateur.space
Date: 1993-08-24 15:21:50 UTC
From: henne@eniac.gmd.de
Message-ID: <henne.746205710@gmd.de>
Source record: 28835

trier@odin.ins.cwru.edu (Stephen C. Trier) writes:

>In article <25bb7a$29v@usenet.ins.cwru.edu>,
>Stephen C. Trier <trier@odin.ins.cwru.edu> wrote:
>>I just read on Clarinet that NOAA-13 had been lost and an inquiry
>>was being conducted.

>(Uh, oh... following up to my own message)

>The Clarinet article said NOAA-13 was lost Saturday morning. The summary
>probably predates that. Never mind my confusion.

> Stephen

I received NOAA-13 APT during three europe-afternoon-passes and
copied the image from the nearest pass showing vis-channels 1 and 2.
Everything was normal. AOS and LOS corresponded perfectly to
the 2-line-elements.
So *IF* NOAA-13 is lost, it occurred LATER THAN saturday AUG 21 1500 UT.
No doubt this is more or less MORNING for the United States.

Inactive NOAA-13 APT is planned for now and gives no evidence that
the spacecraft is lost. From TBUS-info: NOAA-13 APT and BCN will
be switched off sunday AUG 22 1500 UT(?) due to VHF-conflict with
NOAA-11. This is a normal procedure when spacecrafts using the
same frequencies (137.62 APT, 137.77 BCN) have such a low distance
that both are above the local horizon, resulting in interference.
This sometimes occures with NOAA-10 and NOAA-12 too.

I will try to observe and get more info, unfortunately
the wxsat-mail-list is down right now :-(

Regards

Peter

----
e-mail: peter.henne@gmd.de
----

130. NOAA-13 probably lost

Newsgroup: rec.radio.amateur.space
Date: 1993-08-24 16:13:49 UTC
From: peter.henne@gmd.de
Message-ID: <1993Aug24.161349.25641@gmd.de>
Source record: 28836

I repost the following article from sci.space.news:

Pat Viets
NOAA/NESDIS
(Phone: 301/763-2560)

RELEASE: 93-151

CONTROLLERS LOSE CONTACT WITH NOAA-13 SATELLITE

Satellite controllers lost contact with the NOAA-13 satellite on Saturday, and preliminary indications are that the spacecraft's power system is not working, officials at NASA and the National Oceanic and Atmospheric Administration said today.

All battery charging aboard the satellite ceased at approximately 3:45 p.m. EDT Aug. 21, said Charles E. Thienel, Meteorological Satellites Project Manager at NASA's Goddard Space Flight Center, Greenbelt, Md. Contact with the spacecraft during subsequent ground passes showed steadily decreasing battery voltages and currents, he said.

Output from the solar arrays continued to be normal, Thienel said, indicating a failure in the circuitry between the solar arrays and the batteries. There has been no contact with the spacecraft since approximately 7:15 p.m. EDT Aug. 21.

The spacecraft was launched by the U.S. Air Force from Vandenberg Air Force Base, Calif., on Aug. 9. Spacecraft operations were turned over to NOAA on Aug. 12 as a part of planned checkout procedures. Instrument checkouts were continuing at the time of the failure.

NOAA-13 is the newest in a series of polar-orbiting weather satellites. It is designed to monitor the Earth's ocean and atmosphere. It collects meteorological and ocean data for direct transmission to users around the world and to central data processing centers.

NOAA-11, which NOAA-13 was planned to replace, was launched in September 1988 and NOAA-12 in May 1991. Both are providing environmental data to users around the world. NOAA officials said the problem with NOAA-13 would not affect weather coverage. Instruments on NOAA-11 and NOAA-12 are providing full coverage. NOAA-13 was called up to ensure continuity of data because of degradation in NOAA-11's instruments and spacecraft subsystems.

The spacecraft was built by Martin Marietta Astro Space in East Windsor, N.J. The spacecraft completed its initial functional and environmental testing in early 1990. The spacecraft then was held in standby with routinely scheduled aliveness testing until March 1993, when it went

through complete functional checkout in preparation for launch.

NASA and NOAA will convene a review board to investigate the incident.
Martin Marietta already has convened its review board.

--- End of article ---

My comment:
NOAA-13-APT-image from saturday AUG 21 around 1230 UT pass over europe
(crossing 50 NLAT at 3 ELON) was absolutely normal, I really dont
hope that it just was me who recorded the last image of
a spacecraft passing away!

Really bad news these days: Mars Observer lost! NOAA-13 lost! 8-(

Peter

+--+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+--+

131. Re: NOAA-13 probably lost

Newsgroup: rec.radio.amateur.space
Date: 1993-08-24 22:17:13 UTC
From: ollie@eudaemon.West.Sun.COM
Message-ID: <25e419INNmmu@west.West.Sun.COM>
Source record: 28837

Just a quick observation/question:

While reading about Mars Observer and NOAA-13, I have noticed
that both have ties back to New Jersey. Did Martin Marietta-NJ
manufacture both spacecraft, or play some significant role
in the fabrication of these spacecraft? If so, things must be
pretty grim around there right now. Must be like losing a child.

Ollie

132. ELECTRONICS FOR DECODING AVHRR

Newsgroup: rec.radio.amateur.space
Date: 1993-08-27 07:51:05 UTC
From: sttlmb@puknet.puk.ac.za
Message-ID: <sttlmb.1@puknet.puk.ac.za>
Source record: 28842

I am presently receiving Meteosat APT on 1691 and 1694.5 MHz and displaying
on a IBM pc. I would like to expand my system to include NOAA AVHRR.

I have the arcticles by Christieson from Wireless World Nov. '80 to Jan. '81
and would like to know if updated deconding circuits is available.
Any additional info would be welcome.

Thanks

Louis Botha.

133. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-08-28 15:17:41 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-746551053@unomaha.edu>
Source record: 28843
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

```
Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.
Due to the recent reorganization, it is also on a temporarily-
accelerated posting schedule as follows:

July weekly
August bi-weekly
September back to monthly)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
```

arrangement, but one was that the system was not supposed to be used for commercial purposes. Since one of hams' favorite pastimes is swapping gear, it was natural for hams to post messages about equipment for sale to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use restriction, and after some argument, a group was created specifically for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
===========================

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

134. APT-Satellites: Report AUG 28, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-08-30 08:04:48 UTC
From: peter.henne@gmd.de
Message-ID: <1993Aug30.080448.26134@gmd.de>
Source record: 28844
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, AUG 28, 1993

NOAA-9: APT 137.62 *OFF*
NOAA-10: APT 137.50 ON again
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
NOAA-13: APT 137.62 *OFF*
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

A lot of *OFF*s! NOAA-13 seems to be definitely lost, but if
not, there would be a VHF-conflict with NOAA-11, thus it is off
anyway. Meteor 3-3 shows its well-known problem: Brightness-
fluctuations in the image, besides of this, APT is ok.
NOAA-9 is on the list due to this good news from wxsat-mail-list:
-- N-9 BEING RETURNED TO STANDBY STATUS ON OR ABOUT 9/6/93. --
Lets hope that this good old spacecraft can be revitalized again.
```


```
+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

135. Welcome to rec.radio.info!

Newsgroup: rec.radio.amateur.space
Date: 1993-08-31 04:01:47 UTC
From: rec-radio-info@ve6mgs.ampr.ab.ca
Message-ID: <rec.radio.info-welcome_746766090@ve6mgs.ampr.org>
Source record: 28765
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.space,rec.radio.amateur.digital.misc,rec.radio.amateur.policy,rec.radio.shortwave,rec.radio.cb,rec.radio.noncomm,alt.radio.scanner,rec.radio.info,news.answers,rec.answers

```
Archive-name: radio/rec-radio-info/welcome
Last-modified: $Date: 1993/05/16 21:57 $
Version: $Revision: 1.05 $

*** Welcome to rec.radio.info! ***

Welcome to rec.radio.info, a group that aims to provide a noise-free source
of information and news for the entire rec.radio hierarchy.

Two introductory articles about rec.radio.info are posted to the group and
to news.answers every two weeks. You are now reading the first article, which
explains what rec.radio.info is, and answers some Frequently Asked Questions.
The second article is titled "Submission Guidelines", and you only need to
read it if you want to submit an article to rec.radio.info.

You can skip to the next section of this article by searching for the next
" -- " string. The sections available are:
- What is the purpose of rec.radio.info?
- Why are messages almost always cross posted to rec.radio.info?
- What is a 'follow-up', and what does 'moderated' mean?
- OK, so now I know what 'moderated' means. Tell me more.
- What type of material is considered inappropriate?
- I do not have access to news, how can I get the information posted to
rec.radio.info?
- Will the material appearing in rec.radio.info be archived somewhere?
- I have a regular posting with timely information, is there a way to
speed up it's delivery, or automate for more convenience?

-- What is the purpose of rec.radio.info?

The purpose or charter of rec.radio.info is to provide the Usenet community with
a resource for information, news, and facts about any and all things radio.

All the other rec.radio groups are intended for discussions and general chit
chat about radio. Rec.radio.info will contain informational, factual articles
only. Follow-ups are redirected to an appropriate other group, and further
discussion (if any) will not take place in rec.radio.info.

In order to ensure that rec.radio.info contains only appropriate articles, it
was decided to create the group as a moderated newsgroup.

-- Why are messages almost always cross posted to rec.radio.info?

It provides a "tag" for each article to be assembled into a filtered
presentation in rec.radio.info (even with cross-posting, only one message, with
```

a unique Message-ID, is propogated across the net). This tag also facilitates a pre-existing method of dropping or cancelling the articles locally within the discussion groups if you don't want to see them. This accommodates individuals who want to separate the bulletins from the discussions, discussions from the bulletins, as well as those who are adamant about not reading another newsgroup and wanted to see everything all in one basket.

With the total size of Usenet (in number of newsgroups and total traffic) doubling every year or so, this is no insignificant contribution to reducing information noise and chaos. Making the discussion groups a catch-all, and making extra newsgroups filters on that catch-all, is also the most realistic way to implement such a scheme (It's not intuitively obvious what the charter, contents, and general appropriate topics for each and every newsgroup are. Seeing FAQ's and charter/intro postings in the home newsgroup is beneficial for new readers).

By cross-posting one only is adding a few tens of bytes to each bulletin (to specify the extra group on the Newsgroups line), but are adding the capability for very powerful filtering features available on most news servers, listservers and readers. Your local news guru could probably explain these features in more detail.

In rn, for example, according to Leanne Phillips in her rn kill-file FAQ, add a line of the form:
/Newsgroups:.*[,]rec\.radio\.info/h:j
either in ~/News/KILL (if you don't want to see rec.radio.info articles anywhere) or ~/News/rec/radio/amateur/misc/KILL (if you don't want to see them just in rec.radio.amateur.misc). The latter method means your kill file will only be consulted during rec.radio.amateur.misc (and hence runs more efficiently), and will probably work for most people.

In nn, according to Bill Wohler in his nn FAQ, add a line of the form:
rec.radio.info:!s/:^
in ~/.nn/kill (if you don't want to see rec.radio.info articles anywhere), or put the following lines:
sequence
rec.radio.info
rec.radio.
at the end of ~/.nn/init in order to see all the rec.radio.info bulletins first, then read the remaining rec.radio.* without the bulletins.

-- What is a 'follow-up', and what does 'moderated' mean?

If you are new to Usenet and are not familiar with the terminology, you might want to read the general introductory articles found in the newsgroup news.announce.newusers. Doing so will make your life on the net much easier, and will probably save you from making silly beginner's mistakes.

If you think that at this moment you are reading an echo, a conference, or a bulletin board, I'd also strongly suggest a trip over to news.announce.newusers.

For the rest of this article, I will assume you have a basic knowledge of Usenet terminology and mechanics.

A moderated group means that any article that needs to be posted to the group has to be accepted by the moderator of the group. Since we need to ensure that followups to an article (discussion) do not show up in the rec.radio.info newsgroup, the `Followup-To:' header line contains a newsgroup that is appropriate for disussions about the specific article.

-- OK, so now I know what 'moderated' means. Tell me more.

Rec.radio.info is a moderated newsgroup, which means that all articles submitted to the group will have to be approved by the moderator first.

The current moderator of the group is Mark Salyzyn. Submissions to rec.radio.info can be posted, or e-mailed to:

rec-radio-info@ve6mgs.ampr.ab.ca

Comments, criticisms, suggestions or questions about the group can be e-mailed to:
rec-radio-request@ve6mgs.ampr.ab.ca

But before you do so, please be sure to check out the "Submission Guidelines" article.

The influence of the moderator should be minimal and of an administrative nature, consisting chiefly of weeding out obviously inappropriate articles, while making sure correct headers etc. are used for the appropriate ones.

-- What type of material is considered inappropriate?

There are three broad categories of articles which will be rejected by the moderator:

1) Requests for information: rec.radio.info is strictly a one-way street. I receive information in my mailbox; I then post it to rec.radio.info. Requests for specific information belong in the normal discussion newsgroups. If your request gets answered, you might consider passing the answer on to rec.radio.info, though. Especially if you can edit it into a informational, rather than a discussion, format.

2) Obvious discussion articles, or articles that appear unsubstantiated.

3) Commercial stuff: a relatively unbiased test of a radio product would be accepted, but any hint of for-profit might be reason for rejection. For three reasons: This is not the purpose of the list, for-profit is a controversial topic, and this list may be passed onto Amateur Packet Radio (where for-profit is prohibited except under certain provisos).

rec.radio.swap (or possibly comp.newprod) may be more deserving of the posting in any matter.

Similarly, copyrighted material generally cannot be used. If it's TRULY worthwhile to the net, I would recommend obtaining permission from the copyright holder. Please note the source, and if permission was given. I

reserve the right to make the final decision concerning appropriateness in all situations. In most cases, a brief summary of, or pointer to, the copyrighted information may be all I can allow.

-- I do not have access to news, how can I get the information posted to rec.radio.info?

brian@UCSD.EDU (Brian Kantor) has kindly supplied a mail list server for rec.radio.info. Non of the articles will be digested, due to their size, so you will receive individual mailings for every article posted to the group.

Mail sent to radio-info@ucsd.edu will be forwarded to the moderator and thus is an alias to rec-radio-info@ve6mgs.ampr.ab.ca

To subscribe and unsubscribe via the listserver; the format for that is

sub address radio-info
unsub address radio-info

where 'address' is your full mailing address. Send this request to

listserv@ucsd.edu

Note that the server will automatically delete any address that bounces mail. If you leave the address portion blank, it will try to deduce your address from the mail headers. This may not work if you are on bitnet, milnet or some other non-Unix host, so it is recommended to put your return address in any case. For example:

sub mymailbox@myhost.mydomain.mil radio-info
or
sub MEMEME01@DMBHST.bitnet radio-info

or something like that.

-- Will the material appearing in rec.radio.info be archived somewhere?

Yes. Still firming up details at the moment but here is a preliminary list:
- unbc.edu as maintained by Lyndon Nerenberg <lyndon@unbc.edu>
- nic.funet.fi maintained by Risto Kotalampi <rko@cs.tut.fi>
saved to /pub/dx/text/rec.radio.info currently stored as numbered files.

Effectively this means that anything you post to rec.radio.info will be permanently stored, so your work will not be lost.

-- I have a regular posting with timely information, is there a way to speed up it's delivery, or automate for more convenience?

Yes, there is! It may take a bit of chatter with the moderator, but we are willing to take responsible people and provide them the means of posting the articles directly from their site. We will try everything we can as we fully realize that DX (distant signal) and astronomical data can be somewhat transitory. We are also willing to allow regular posters of information the same courtesy, even if the information is not as time critical.

We refer to this as self-moderation, which is partly based on the model for news.answer. This requires co-operation and good will to be beneficial to the community in the rec.radio hierarchy.

I suggest reading the posting guidelines for more information. I am open to suggestions.

I thank the following individuals for their input into this article:
rec.music.info moderator Leo Breebaart rec-music-info@cp.tn.tudelft.nl
rec.radio.broadcasting moderator Bill Pfeiffer wdp@gagme.chi.il.us
Paul W. Schleck, KD3FU pschleck@unomaha.edu
Ian Kluft, KD6EUI ikluft@uts.amdahl.com

--
Mark Salyzyn -- Moderator rec.radio.info
Submissions to: rec-radio-info@ve6mgs.ampr.ab.ca
Administrivia to: rec-radio-request@ve6mgs.ampr.ab.ca
* Requests for information do *not* belong in rec.radio.info *

136. Frequency Forum

Newsgroup: rec.radio.amateur.space
Date: 1993-09-01 04:44:00 UTC
From: Jack.Anderson@f239.n109.z1.fidonet.org
Message-ID: <746867642.AA01002@blkcat.UUCP>
Source record: 28845

```
The Frequency Forum Bulletin Board System in Vienna, VA now carries
this UseNet newsgroup.

Jack Anderson, Sysop

Internet: janderson@ram.net
(alternate) jack.anderson@f239.n109.z1.fidonet.org

-*-SCANNER BBS for VA, MD, DC!-*-
-*-The Frequency Forum-*-(703) 207-9622-*-9600/V.32/MNP-*-
-*-Files, Frequencies and Discussion for Scanner Hobbyists/Radio Amateurs-*
***
* SLMR 2.1a *
```

137. OSCAR 20 Survey

Newsgroup: rec.radio.amateur.space
Date: 1993-09-01 13:23:23 UTC
From: sford@arrl.org
Message-ID: <2153@arrl.org>
Source record: 28846

At the request of the Japan Amateur Radio League, I'm conducting an informal survey concerning their OSCAR 20 satellite.

At present, OSCAR 20 operates a packet BBS each day of the week except Wednesdays. On most Wednesdays, the BBS is switched off and the satellite is available for analog SSB/CW operation for roughly 24 hours. At the end of that period, the BBS resumes operation.

The JARL would like to know if amateurs prefer the schedule as-is, or if more analog operating time is desireable. Please email your comments and I'll forward the results to the JARL.

Thanks and 73...

Steve, WB8IMY
ARRL

138. Satellite Tracking

Newsgroup: rec.radio.amateur.space
Date: 1993-09-01 16:16:00 UTC
From: v087jsfu@ubvms.cc.buffalo.edu
Message-ID: <CConrM.3J7@acsu.buffalo.edu>
Source record: 28847

Is there any satellite tracking software available written for VAX use?
If so, where can I get a copy? Thanks.

Danny Anderson
N2UPM

139. What happened to...

Newsgroup: rec.radio.amateur.space
Date: 1993-09-02 00:45:36 UTC
From: denis@louisville.GVG.TEK.COM
Message-ID: <263fng$gh8@gvgspd.gvg.tek.com>
Source record: 28848

I first became interested in amateur satellites back in 1983; I couldn't set up my own station at that time (finances and space), but have once again started planning one.

Two things have puzzled me, as I lurk in this group and watch ANS bulletins:
1. It was thought by some in those days, despite the popularity of the lower VHF modes, that mode L would be the mode of the future. Yet, I've seen little or nothing to indicate mode L is at all active (I'm currently without a receiver to confirm this). Did the birds fail? Was there no interest or support? What happened to mode L?

2. There was a proposal to the FCC, circa 1985, by Cablesat General (?) to put 5.6/3.3GHz transponders for amateur use on their geo-sync. sats. Did that get approved and is it operational? Was it bypassed for 10GHz instead?

I apologize if these are not educated questions, but I've been out of touch for 10 years. There's probably a plethora of things which have changed in that time.

Thanks in advance.
--
(}-:D

140. 11 year old with an interest in Space

Newsgroup: rec.radio.amateur.space
Date: 1993-09-02 00:48:32 UTC
From: Jim Jaskie <jim_jaskie@tempeqm.sps.mot.com>
Message-ID: <1993Sep2.004832.24699@newsgate.sps.mot.com>
Source record: 28849

Hi. I have an 11 year old boy that is very interested in SPACE (well, mostly Star Trek). I would like to use that enthusiasm and encourage it by building (with him) an amateur sattelite Rx/Tx (maybe EME?) station out in the barn. This is meant to be a learning experience for him, not a hobby for me, which complicates it somewhat. I can get involved in all sorts of fool things and enjoy it. I need to balance his understanding and interests. This balance never seems to be easy.

I've been going through the ARRL Handbook and the ARRL antenna book, but I have no familiarity with the amateur satellite community and the "normal" ways of doing this. Anyway, this is what I was thinking about trying. I'll get a radio (Yaesu 5200 ?) and a high gain antenna. Something like a Cushcraft 26B2. I see "satellite antennas" for sale, though I don't know why they are different. I assume I will need to mount this antenna on a rotor, though I have no idea yet about what type of rotor (any rotor in the AES catalog?). He would help me put this together and mount the antenna, and then track the satellites. This setup should allow us to then make contact with satellites (including MIR?) and maybe even try some EME. Does this seem like a reasonable way to set this up? Any better recommendations? Reference sources or national clubs with magazines? I'd appreciate any help that you can give me. I'd like to see my son become excited enough to start studying for his license.

Thanks,
Jim

"A vacuum is a hell of a lot better than some of the stuff that Nature replaces it with." Tennessee Williams.

141. Electronics for receiving AVHRR ??

Newsgroup: rec.radio.amateur.space
Date: 1993-09-02 10:11:01 UTC
From: sttlmb@puknet.puk.ac.za
Message-ID: <sttlmb.2@puknet.puk.ac.za>
Source record: 28850

I am presently receiving Meteosat (NOAA and METEOR as well) APT on 1691 and 1694.5 MHz.

Most of the electronics is home-made and the software is also self-written. The display resolution is 600x600 pixels with 64 gray-scales and software functions include auto-start, auto-storing of pictures, animation, zooming and false-color enhancement.

I now would like to expand my system to include NOAA AVHRR. I have the articles by Christieson from Wireless World Nov. '80 to Jan. '81 for building the receiver/decoder. It would be of great help if anyone can give me more up-to-date information for building the complete decoder.

Thanks

Louis.

142. Re: What happened to...

Newsgroup: rec.radio.amateur.space
Date: 1993-09-02 10:25:36 UTC
From: n4hy@tang.ccr-p.ida.org
Message-ID: <N4HY.93Sep2102536@tang.ccr-p.ida.org>
Source record: 28851

Denis:

AO-10 lost its computer and cannot be switched to Mode L. It had an antenna relay problem anyway and was not very sensitive. AO-13 recently lost the HPA for 70 cm so can no longer transmit on Mode L. Since there are NO RESOURCES for you to use Mode L, it has indeed lost its popularity ;-). Mode L is indeed planned for the `next big one', Phase III-D. All of this stuff was in ANS bulletins.

Bob

--

Robert W. McGwier | n4hy@ccr-p.ida.org
Center for Communications Research | Interests: amateur radio, astronomy,golf
Princeton, N.J. 08520 | Asst Scoutmaster Troop 5700, Hightstown

143. ORBS$247.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-09-03 18:11:21 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-247.o@ampr.org>
Source record: 28857
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-247.O
Orbital Elements 247.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX September 4, 1993
BID: $ORBS-247.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93242.43477156
Element set: 28
Inclination: 27.1484 deg
RA of node: 8.3889 deg
Eccentricity: 0.6020736
Arg of perigee: 110.0361 deg
Mean anomaly: 321.9242 deg
Mean motion: 2.05883051 rev/day
Decay rate: -9.4e-07 rev/day^2
Epoch rev: 7679
Checksum: 292

Satellite: UO-11
Catalog number: 14781
Epoch time: 93246.08378723
Element set: 434
Inclination: 97.8062 deg
RA of node: 269.0247 deg
Eccentricity: 0.0012973
Arg of perigee: 104.5993 deg
Mean anomaly: 255.6653 deg
Mean motion: 14.69048346 rev/day
Decay rate: 2.29e-06 rev/day^2
Epoch rev: 50815
Checksum: 330

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93242.81629576
Element set: 644
Inclination: 82.9262 deg
RA of node: 183.4517 deg
Eccentricity: 0.0012832
Arg of perigee: 105.3122 deg
```

Mean anomaly: 254.9422 deg
Mean motion: 13.72322463 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 31008
Checksum: 290

Satellite: AO-13
Catalog number: 19216
Epoch time: 93243.34390194
Element set: 638
Inclination: 57.9011 deg
RA of node: 297.2789 deg
Eccentricity: 0.7212473
Arg of perigee: 323.1390 deg
Mean anomaly: 4.6591 deg
Mean motion: 2.09720544 rev/day
Decay rate: -3.8e-07 rev/day^2
Epoch rev: 3993
Checksum: 313

Satellite: FO-20
Catalog number: 20480
Epoch time: 93238.02962241
Element set: 454
Inclination: 99.0301 deg
RA of node: 80.9627 deg
Eccentricity: 0.0540206
Arg of perigee: 288.4822 deg
Mean anomaly: 65.8314 deg
Mean motion: 12.83220726 rev/day
Decay rate: -9.0e-08 rev/day^2
Epoch rev: 16627
Checksum: 289

Satellite: AO-21
Catalog number: 21087
Epoch time: 93245.79202704
Element set: 840
Inclination: 82.9454 deg
RA of node: 355.3915 deg
Eccentricity: 0.0035637
Arg of perigee: 163.0089 deg
Mean anomaly: 197.2235 deg
Mean motion: 13.74524288 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 13010
Checksum: 303

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93246.11094909

Element set: 418
Inclination: 82.9212 deg
RA of node: 224.3223 deg
Eccentricity: 0.0028117
Arg of perigee: 185.5843 deg
Mean anomaly: 174.5004 deg
Mean motion: 13.74026069 rev/day
Decay rate: 2.0e-07 rev/day^2
Epoch rev: 12922
Checksum: 280

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93241.80475365
Element set: 21
Inclination: 1.3018 deg
RA of node: 119.8566 deg
Eccentricity: 0.2933615
Arg of perigee: 152.1382 deg
Mean anomaly: 232.4293 deg
Mean motion: 1.42202460 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 162
Checksum: 258

/EX
SB KEPS @ AMSAT $ORBS-247.D
Orbital Elements 247.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX September 4, 1993
BID: $ORBS-247.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93243.72253714
Element set: 766
Inclination: 98.6111 deg
RA of node: 327.1531 deg
Eccentricity: 0.0010696
Arg of perigee: 326.5836 deg
Mean anomaly: 33.4670 deg
Mean motion: 14.29789001 rev/day
Decay rate: 2.9e-07 rev/day^2
Epoch rev: 18822
Checksum: 302

Satellite: AO-16
Catalog number: 20439
Epoch time: 93244.20933745
Element set: 571

Inclination: 98.6183 deg
RA of node: 328.5842 deg
Eccentricity: 0.0011106
Arg of perigee: 325.5752 deg
Mean anomaly: 34.4711 deg
Mean motion: 14.29847874 rev/day
Decay rate: 3.8e-07 rev/day^2
Epoch rev: 18830
Checksum: 314

Satellite: DO-17
Catalog number: 20440
Epoch time: 93243.77173528
Element set: 573
Inclination: 98.6193 deg
RA of node: 328.3848 deg
Eccentricity: 0.0011246
Arg of perigee: 326.4849 deg
Mean anomaly: 33.5620 deg
Mean motion: 14.29984193 rev/day
Decay rate: 3.8e-07 rev/day^2
Epoch rev: 18825
Checksum: 331

Satellite: WO-18
Catalog number: 20441
Epoch time: 93244.23210932
Element set: 575
Inclination: 98.6190 deg
RA of node: 328.8613 deg
Eccentricity: 0.0011756
Arg of perigee: 325.1740 deg
Mean anomaly: 34.8673 deg
Mean motion: 14.29963179 rev/day
Decay rate: 2.8e-07 rev/day^2
Epoch rev: 18832
Checksum: 312

Satellite: LO-19
Catalog number: 20442
Epoch time: 93244.29915769
Element set: 572
Inclination: 98.6197 deg
RA of node: 329.1196 deg
Eccentricity: 0.0012116
Arg of perigee: 324.4877 deg
Mean anomaly: 35.5488 deg
Mean motion: 14.30053906 rev/day
Decay rate: 3.4e-07 rev/day^2
Epoch rev: 18834
Checksum: 329

Satellite: UO-22
Catalog number: 21575
Epoch time: 93245.12479416
Element set: 271
Inclination: 98.4674 deg
RA of node: 319.9787 deg
Eccentricity: 0.0008730
Arg of perigee: 69.7918 deg
Mean anomaly: 290.4202 deg
Mean motion: 14.36848075 rev/day
Decay rate: 6.8e-07 rev/day^2
Epoch rev: 11171
Checksum: 332

Satellite: KO-23
Catalog number: 22077
Epoch time: 93244.23870192
Element set: 113
Inclination: 66.0795 deg
RA of node: 164.9560 deg
Eccentricity: 0.0000218
Arg of perigee: 9.2207 deg
Mean anomaly: 350.8816 deg
Mean motion: 12.86279243 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 4962
Checksum: 276

/EX
SB KEPS @ AMSAT $ORBS-247.W
Orbital Elements 247.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX September 4, 1993
BID: $ORBS-247.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93246.08191686
Element set: 451
Inclination: 99.0948 deg
RA of node: 287.5851 deg
Eccentricity: 0.0014648
Arg of perigee: 312.3973 deg
Mean anomaly: 47.5988 deg
Mean motion: 14.13542177 rev/day
Decay rate: 7.8e-07 rev/day^2
Epoch rev: 44978
Checksum: 361

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93246.01843878
Element set: 293
Inclination: 98.5163 deg
RA of node: 258.7230 deg
Eccentricity: 0.0014313
Arg of perigee: 86.9735 deg
Mean anomaly: 273.3088 deg
Mean motion: 14.24829834 rev/day
Decay rate: 6.5e-07 rev/day^2
Epoch rev: 36171
Checksum: 334

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93245.72313908
Element set: 883
Inclination: 82.5459 deg
RA of node: 137.2592 deg
Eccentricity: 0.0015588
Arg of perigee: 272.2319 deg
Mean anomaly: 87.7056 deg
Mean motion: 13.84692776 rev/day
Decay rate: 6.0e-07 rev/day^2
Epoch rev: 28257
Checksum: 346

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93245.30396115
Element set: 57
Inclination: 82.5438 deg
RA of node: 167.3889 deg
Eccentricity: 0.0015684
Arg of perigee: 264.9908 deg
Mean anomaly: 94.9423 deg
Mean motion: 13.16960526 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 24536
Checksum: 332

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93245.92467374
Element set: 203
Inclination: 99.1412 deg
RA of node: 223.2909 deg
Eccentricity: 0.0011110
Arg of perigee: 218.3881 deg
Mean anomaly: 141.6494 deg
Mean motion: 14.12911409 rev/day
Decay rate: 9.7e-07 rev/day^2

Epoch rev: 25465
Checksum: 289

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93245.41716673
Element set: 821
Inclination: 82.5184 deg
RA of node: 13.3397 deg
Eccentricity: 0.0014003
Arg of perigee: 320.2466 deg
Mean anomaly: 39.7667 deg
Mean motion: 13.84342034 rev/day
Decay rate: 2.3e-07 rev/day^2
Epoch rev: 22787
Checksum: 301

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93245.66288081
Element set: 730
Inclination: 82.5531 deg
RA of node: 110.2287 deg
Eccentricity: 0.0015565
Arg of perigee: 287.2155 deg
Mean anomaly: 72.7282 deg
Mean motion: 13.16023296 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18529
Checksum: 289

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93245.60834188
Element set: 573
Inclination: 82.5445 deg
RA of node: 76.8988 deg
Eccentricity: 0.0014593
Arg of perigee: 234.8302 deg
Mean anomaly: 125.1492 deg
Mean motion: 13.84178619 rev/day
Decay rate: 1.3e-07 rev/day^2
Epoch rev: 16083
Checksum: 326

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93244.80145507
Element set: 623
Inclination: 98.8563 deg
RA of node: 268.8793 deg

Eccentricity: 0.0017092
Arg of perigee: 95.2908 deg
Mean anomaly: 265.0213 deg
Mean motion: 14.01291679 rev/day
Decay rate: -1.04e-06 rev/day^2
Epoch rev: 15331
Checksum: 313

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93244.25669813
Element set: 577
Inclination: 82.5232 deg
RA of node: 15.8543 deg
Eccentricity: 0.0013303
Arg of perigee: 131.8680 deg
Mean anomaly: 228.3618 deg
Mean motion: 13.83556331 rev/day
Decay rate: 2.1e-07 rev/day^2
Epoch rev: 14780
Checksum: 290

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93244.28877186
Element set: 397
Inclination: 82.5435 deg
RA of node: 13.8333 deg
Eccentricity: 0.0013135
Arg of perigee: 183.2102 deg
Mean anomaly: 176.8939 deg
Mean motion: 13.16452974 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11334
Checksum: 298

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93244.70721632
Element set: 658
Inclination: 98.6523 deg
RA of node: 273.3978 deg
Eccentricity: 0.0013231
Arg of perigee: 357.4737 deg
Mean anomaly: 2.6369 deg
Mean motion: 14.22305579 rev/day
Decay rate: 1.59e-06 rev/day^2
Epoch rev: 11952
Checksum: 311

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93243.26873480
Element set: 453
Inclination: 82.5517 deg
RA of node: 321.4819 deg
Eccentricity: 0.0012095
Arg of perigee: 202.2516 deg
Mean anomaly: 157.8083 deg
Mean motion: 13.16822957 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9830
Checksum: 303

Satellite: NOAA-13
Catalog number: 22739
Epoch time: 93237.13666185
Element set: 19
Inclination: 98.9083 deg
RA of node: 178.2681 deg
Eccentricity: 0.0009074
Arg of perigee: 232.2199 deg
Mean anomaly: 127.8966 deg
Mean motion: 14.10834924 rev/day
Decay rate: -2.3111e-04 rev/day^2
Epoch rev: 221
Checksum: 312

/EX
SB KEPS @ AMSAT $ORBS-247.M
Orbital Elements 247.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX September 4, 1993
BID: $ORBS-247.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93246.19731056
Element set: 275
Inclination: 51.6194 deg
RA of node: 187.6197 deg
Eccentricity: 0.0004920
Arg of perigee: 57.2289 deg
Mean anomaly: 302.9049 deg
Mean motion: 15.59504884 rev/day
Decay rate: 9.729e-05 rev/day^2
Epoch rev: 43130
Checksum: 327

Satellite: HUBBLE
Catalog number: 20580

Epoch time: 93245.77858926
Element set: 170
Inclination: 28.4712 deg
RA of node: 284.1723 deg
Eccentricity: 0.0004753
Arg of perigee: 138.6278 deg
Mean anomaly: 221.4669 deg
Mean motion: 14.92816482 rev/day
Decay rate: 6.73e-06 rev/day^2
Epoch rev: 18312
Checksum: 318

Satellite: GRO
Catalog number: 21225
Epoch time: 93244.62111663
Element set: 980
Inclination: 28.4534 deg
RA of node: 98.7198 deg
Eccentricity: 0.0008242
Arg of perigee: 119.8795 deg
Mean anomaly: 240.2644 deg
Mean motion: 15.75809013 rev/day
Decay rate: 2.5338e-04 rev/day^2
Epoch rev: 1217
Checksum: 301

Satellite: UARS
Catalog number: 21701
Epoch time: 93241.02699369
Element set: 254
Inclination: 56.9809 deg
RA of node: 249.5518 deg
Eccentricity: 0.0003371
Arg of perigee: 106.2115 deg
Mean anomaly: 253.9291 deg
Mean motion: 14.96133594 rev/day
Decay rate: -2.000e-05 rev/day^2
Epoch rev: 10720
Checksum: 283

/EX

144. ORBS$247.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-09-03 18:12:56 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-247.n@ampr.org>
Source record: 28860
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-247.N
2Line Orbital Elements 247.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX September 4, 1993
BID: $ORBS-247.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93242.43477156 -.00000094 00000-0 99999-4 0 284
2 14129 27.1484 8.3889 6020736 110.0361 321.9242 2.05883051 76791
UO-11
1 14781U 84 21 B 93246.08378723 .00000229 00000-0 42866-4 0 4345
2 14781 97.8062 269.0247 0012973 104.5993 255.6653 14.69048346508154
RS-10/11
1 18129U 87 54 A 93242.81629576 .00000088 00000-0 89554-4 0 6447
2 18129 82.9262 183.4517 0012832 105.3122 254.9422 13.72322463310084
AO-13
1 19216U 88 51 B 93243.34390194 -.00000038 00000-0 -88519-3 0 6382
2 19216 57.9011 297.2789 7212473 323.1390 4.6591 2.09720544 39937
FO-20
1 20480U 90 13 C 93238.02962241 -.00000009 00000-0 84068-5 0 4545
2 20480 99.0301 80.9627 0540206 288.4822 65.8314 12.83220726166273
AO-21
1 21087U 91 6 A 93245.79202704 .00000085 00000-0 82656-4 0 8407
2 21087 82.9454 355.3915 0035637 163.0089 197.2235 13.74524288130102
RS-12/13
1 21089U 91 7 A 93246.11094909 .00000020 00000-0 15661-4 0 4185
2 21089 82.9212 224.3223 0028117 185.5843 174.5004 13.74026069129222
ARSENE
1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
UO-14
1 20437U 90 5 B 93243.72253714 .00000029 00000-0 19362-4 0 7660
2 20437 98.6111 327.1531 0010696 326.5836 33.4670 14.29789001188226
AO-16
1 20439U 90 5 D 93244.20933745 .00000038 00000-0 22397-4 0 5711
```

```
2 20439 98.6183 328.5842 0011106 325.5752 34.4711 14.29847874188309
DO-17
1 20440U 90 5 E 93243.77173528 .00000038 00000-0 22644-4 0 5736
2 20440 98.6193 328.3848 0011246 326.4849 33.5620 14.29984193188257
WO-18
1 20441U 90 5 F 93244.23210932 .00000028 00000-0 18688-4 0 5754
2 20441 98.6190 328.8613 0011756 325.1740 34.8673 14.29963179188323
LO-19
1 20442U 90 5 G 93244.29915769 .00000034 00000-0 20867-4 0 5727
2 20442 98.6197 329.1196 0012116 324.4877 35.5488 14.30053906188349
UO-22
1 21575U 91 50 B 93245.12479416 .00000068 00000-0 30110-4 0 2718
2 21575 98.4674 319.9787 0008730 69.7918 290.4202 14.36848075111718
KO-23
1 22077U 92 52 B 93244.23870192 .00000000 00000-0 99999-4 0 1137
2 22077 66.0795 164.9560 0000218 9.2207 350.8816 12.86279243 49621
NOAA-9
1 15427U 84123 A 93246.08191686 .00000078 00000-0 51562-4 0 4511
2 15427 99.0948 287.5851 0014648 312.3973 47.5988 14.13542177449785
NOAA-10
1 16969U 86 73 A 93246.01843878 .00000065 00000-0 35945-4 0 2936
2 16969 98.5163 258.7230 0014313 86.9735 273.3088 14.24829834361716
MET-2/17
1 18820U 88 5 A 93245.72313908 .00000060 00000-0 47962-4 0 8836
2 18820 82.5459 137.2592 0015588 272.2319 87.7056 13.84692776282576
MET-3/2
1 19336U 88 64 A 93245.30396115 .00000043 00000-0 99999-4 0 570
2 19336 82.5438 167.3889 0015684 264.9908 94.9423 13.16960526245368
NOAA-11
1 19531U 88 89 A 93245.92467374 .00000097 00000-0 62732-4 0 2035
2 19531 99.1412 223.2909 0011110 218.3881 141.6494 14.12911409254652
MET-2/18
1 19851U 89 18 A 93245.41716673 .00000023 00000-0 14914-4 0 8210
2 19851 82.5184 13.3397 0014003 320.2466 39.7667 13.84342034227877
MET-3/3
1 20305U 89 86 A 93245.66288081 .00000043 00000-0 99999-4 0 7302
2 20305 82.5531 110.2287 0015565 287.2155 72.7282 13.16023296185295
MET-2/19
1 20670U 90 57 A 93245.60834188 .00000013 00000-0 66696-5 0 5737
2 20670 82.5445 76.8988 0014593 234.8302 125.1492 13.84178619160835
FY-1/2
1 20788U 90 81 A 93244.80145507 -.00000104 00000-0 -57884-4 0 6232
2 20788 98.8563 268.8793 0017092 95.2908 265.0213 14.01291679153313
MET-2/20
1 20826U 90 86 A 93244.25669813 .00000021 00000-0 13645-4 0 5771
2 20826 82.5232 15.8543 0013303 131.8680 228.3618 13.83556331147803
MET-3/4
1 21232U 91 30 A 93244.28877186 .00000043 00000-0 99999-4 0 3970
2 21232 82.5435 13.8333 0013135 183.2102 176.8939 13.16452974113347
NOAA-12
```

```
1 21263U 91 32 A 93244.70721632 .00000159 00000-0 79911-4 0 6587
2 21263 98.6523 273.3978 0013231 357.4737 2.6369 14.22305579119526
MET-3/5
1 21655U 91 56 A 93243.26873480 .00000043 00000-0 99999-4 0 4530
2 21655 82.5517 321.4819 0012095 202.2516 157.8083 13.16822957 98308
NOAA-13
1 22739U 93 50 A 93237.13666185 -.00023111 00000-0 -12987-1 0 191
2 22739 98.9083 178.2681 0009074 232.2199 127.8966 14.10834924 2213
MIR
1 16609U 86 17 A 93246.19731056 .00009729 00000-0 12647-3 0 2757
2 16609 51.6194 187.6197 0004920 57.2289 302.9049 15.59504884431304
HUBBLE
1 20580U 90 37 B 93245.77858926 .00000673 00000-0 56348-4 0 1706
2 20580 28.4712 284.1723 0004753 138.6278 221.4669 14.92816482183122
GRO
1 21225U 91 27 B 93244.62111663 .00025338 00000-0 15421-3 0 9806
2 21225 28.4534 98.7198 0008242 119.8795 240.2644 15.75809013 12170
UARS
1 21701U 91 63 B 93241.02699369 -.00002000 00000-0 -16573-3 0 2546
2 21701 56.9809 249.5518 0003371 106.2115 253.9291 14.96133594107200
/EX
```

145. Two-Line Orbital Element Set Format

Newsgroup: rec.radio.amateur.space
Date: 1993-09-03 22:39:09 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.747095949@afit.af.mil>
Source record: 28858
Cross-posted to: rec.radio.amateur.space,rec.radio.info

As a service to the satellite user community, the following description of the NORAD two-line orbital element set format is uploaded to sci.space.news and rec.radio.info on a monthly basis. The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity. In addition, element sets (also updated daily) and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

==========

Data for each satellite consists of three lines in the following format:

```
AAAAAAAAAAA
1 NNNNNU NNNNNAAA NNNNN.NNNNNNNN +.NNNNNNNN +NNNNN-N +NNNNN-N N NNNNN
2 NNNNN NNN.NNNN NNN.NNNN NNNNNNN NNN.NNNN NNN.NNNN NN.NNNNNNNNNNNNN
```

Line 0 is a eleven-character name.

Lines 1 and 2 are the standard Two-Line Orbital Element Set Format identical to that used by NORAD and NASA. The format description is:

```
Line 1
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
10-11 International Designator (Last two digits of launch year)
12-14 International Designator (Launch number of the year)
15-17 International Designator (Piece of launch)
19-20 Epoch Year (Last two digits of year)
21-32 Epoch (Julian Day and fractional portion of the day)
34-43 First Time Derivative of the Mean Motion
or Ballistic Coefficient (Depending on ephemeris type)
45-52 Second Time Derivative of Mean Motion (decimal point assumed;
blank if N/A)
54-61 BSTAR drag term if GP4 general perturbation theory was used.
Otherwise, radiation pressure coefficient. (Decimal point assumed)
63-63 Ephemeris type
65-68 Element number
69-69 Check Sum (Modulo 10)
(Letters, blanks, periods, plus signs = 0; minus signs = 1)
```

Line 2
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
09-16 Inclination [Degrees]
18-25 Right Ascension of the Ascending Node [Degrees]
27-33 Eccentricity (decimal point assumed)
35-42 Argument of Perigee [Degrees]
44-51 Mean Anomaly [Degrees]
53-63 Mean Motion [Revs per day]
64-68 Revolution number at epoch [Revs]
69-69 Check Sum (Modulo 10)

All other columns are blank or fixed.

Example:

NOAA 6
1 11416U 86 50.28438588 0.00000140 67960-4 0 5293
2 11416 98.5105 69.3305 0012788 63.2828 296.9658 14.24899292346978

146. Two-Line Orbital Element Sets (TLE254)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-03 22:41:59 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.747096119@afit.af.mil>
Source record: 28764
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #254 -
Alouette 1
1 00424U 62 49 A 93246.01947629 .00000041 00000-0 44484-4 0 7321
2 00424 80.4629 208.3144 0023343 130.6386 229.6798 13.67779665543142
ATS 3
1 03029U 67111 A 93245.37300215 -.00000079 00000-0 99999-4 0 9709
2 03029 14.4405 10.3864 0010867 255.3227 104.6300 1.00271975 94553
Cosmos 398
1 04966U 71 16 A 93246.05629540 .00054756 29369-4 15592-3 0 4120
2 04966 51.4823 323.5575 1300386 273.7812 71.5576 13.23748395733819
Starlette
1 07646U 75010 A 93243.87445776 -.00000066 00000-0 -39984-5 0 5296
2 07646 49.8196 215.0181 0205990 100.8910 261.5234 13.82183295937839
LAGEOS
1 08820U 76039 A 93244.50787151 .00000004 00000-0 99999-4 0 6933
2 08820 109.8667 36.6754 0044164 348.1586 11.7852 6.38666361148712
ETS-2
1 09852U 77014 A 93235.43683811 -.00000145 00000-0 99999-4 0 7751
2 09852 11.6127 45.0617 0002444 53.2545 306.8403 0.99999585 7683
GOES 2
1 10061U 77048 A 93240.88556225 .00000105 00000-0 99999-4 0 528
2 10061 10.6392 49.3006 0001583 58.5443 52.1818 1.00276518 4187
IUE
1 10637U 78012 A 93229.87589108 -.00000195 00000-0 00000+0 0 7775
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TDRS 4
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2 21639 0.0383 111.2999 0002713 45.8140 141.8319 1.00278990 5675
Meteor 3-5
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1 21655U 91 56 A 93243.26873480 .00000043 00000-0 99999-4 0 4530
2 21655 82.5517 321.4819 0012095 202.2516 157.8083 13.16822957 98308
UARS
1 21701U 91 63 B 93241.02699369 -.00002000 00000-0 -16573-3 0 2546
2 21701 56.9809 249.5518 0003371 106.2115 253.9291 14.96133594107200
DMSP B5D2-6
1 21798U 91 82 A 93245.96516998 .00000165 00000-0 96981-4 0 6708
2 21798 98.9584 246.2131 0011991 230.3030 129.7110 14.13709795 91033
Glonass 53
1 21853U 92 5 A 93242.18542679 .00000015 00000-0 99999-4 0 6528
2 21853 64.8393 118.9088 0006472 202.1198 157.9389 2.13102263 12343
Glonass 54
1 21854U 92 5 B 93244.35545420 .00000015 00000-0 00000+0 0 6550
2 21854 64.8503 118.8188 0016900 15.5094 344.6347 2.13103135 12387
Glonass 55
1 21855U 92 5 C 93243.94614746 .00000015 00000-0 00000+0 0 6452
2 21855 64.8618 118.8536 0007030 200.4063 159.6708 2.13103058 12364
JERS-1
1 21867U 92 7 A 93244.78374088 .00004687 00000-0 39490-3 0 9554
2 21867 97.6700 319.8226 0001639 72.0445 288.1799 14.98667190 85184
GPS BII-12
1 21890U 92 9 A 93243.09419730 -.00000007 00000-0 99999-4 0 2905
2 21890 54.3158 268.6794 0058603 157.5429 202.7694 2.00566273 11165
GPS BII-13
1 21930U 92 19 A 93243.30447489 -.00000025 00000-0 99999-4 0 2637
2 21930 55.4547 29.4659 0062422 163.6961 196.4990 2.00562711 10092
EUVE
1 21987U 92 31 A 93244.27957931 .00001505 00000-0 68034-4 0 882
2 21987 28.4322 191.0737 0010258 61.4115 298.7511 15.17539591 68454
SAMPEX
1 22012U 92 38 A 93244.15809418 .00001049 00000-0 90585-4 0 2276
2 22012 81.6724 115.3964 0117683 261.6863 97.0996 14.91522319 63235
GPS BII-14
1 22014U 92 39 A 93244.84066811 .00000012 00000-0 99999-4 0 1699
2 22014 54.9387 209.2347 0084358 290.2421 68.8158 2.00576428 1968
Glonass 56
1 22056U 92 47 A 93242.43925246 -.00000022 00000-0 00000+0 0 4698
2 22056 64.9140 358.9755 0005001 254.7701 105.1958 2.13103751 8410
Glonass 57
1 22057U 92 47 B 93244.43345353 -.00000022 00000-0 00000+0 0 4887
2 22057 64.9317 358.9087 0004185 266.3591 93.6042 2.13103100 8450
Glonass 58
1 22058U 92 47 C 93243.67090945 -.00000022 00000-0 00000+0 0 4876
2 22058 64.9084 358.9411 0010653 288.3243 71.5694 2.13102375 8471
TOPEX
1 22076U 92 52 A 93245.79813806 -.00000001 00000-0 99999-4 0 2950
2 22076 66.0404 167.9371 0008179 263.3206 96.6869 12.80930252 49683
KITSAT-A
1 22077U 92 52 B 93244.23870192 .00000000 00000-0 99999-4 0 1137
2 22077 66.0795 164.9560 0000218 9.2207 350.8816 12.86279243 49621
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S80/T
1 22078U 92 52 C 93238.09116265 .00000000 00000-0 99999-4 0 1061
2 22078 66.0762 177.4184 0001438 91.6864 268.4316 12.86560629 48894
TOPEX R/B
1 22079U 92 52 D 93242.22113629 -.00000002 00000-0 99999-4 0 1280
2 22079 66.0626 181.1183 0071885 324.4864 35.1376 12.77665948 49172
GPS BII-15
1 22108U 92 58 A 93244.80201942 -.00000007 00000-0 99999-4 0 1871
2 22108 54.5244 269.2621 0104245 131.0733 229.8863 2.00566005 7145
FREJA
1 22161U 92 64 A 93245.41765975 .00000157 00000-0 12027-3 0 1507
2 22161 62.9985 300.4965 0772495 289.6393 62.2869 13.21662365 43762
LAGEOS II
1 22195U 92 70 B 93242.44103319 -.00000004 00000-0 99999-4 0 728
2 22195 52.6630 277.4503 0136819 350.4465 9.3506 6.47293667 20124
GPS BII-16
1 22231U 92 79 A 93242.99352824 .00000011 00000-0 99999-4 0 1217
2 22231 54.6892 210.5083 0037185 299.5804 60.0125 2.00569099 5689
GPS BII-17
1 22275U 92 89 A 93243.13248444 .00000012 00000-0 99999-4 0 1036
2 22275 54.6654 208.2036 0042852 259.9435 99.2924 2.00553791 5090
TDRS 5
1 22314U 93 3 B 93244.77238852 .00000037 00000-0 99999-4 0 924
2 22314 0.4656 71.4227 0000220 324.7398 91.8528 1.00556121 2431
GPS BII-18
1 22446U 93 7 A 93241.21058600 -.00000030 00000-0 99999-4 0 1050
2 22446 54.7965 329.2334 0065966 334.8235 24.8999 2.00558702 4084
Glonass 59
1 22512U 93 10 A 93244.06277513 .00000015 00000-0 99999-4 0 2266
2 22512 64.8581 118.6823 0008591 194.6472 165.4207 2.13102354 3965
Glonass 60
1 22513U 93 10 B 93242.12670082 .00000015 00000-0 00000+0 0 2169
2 22513 64.8492 118.7628 0006522 189.9256 170.1482 2.13102661 4128
Glonass 61
1 22514U 93 10 C 93244.23876235 .00000015 00000-0 00000+0 0 2094
2 22514 64.8728 118.6812 0013624 188.6556 171.4173 2.13102709 4163
ASTRO-D
1 22521U 93 11 A 93240.63790084 .00001215 00000-0 10155-3 0 446
2 22521 31.1019 112.4723 0077072 115.8071 245.0534 14.92544933 28349
UHF F1
1 22563U 93 15 A 93241.17954482 .00000021 00000-0 99999-4 0 369
2 22563 27.1581 304.0128 0006505 243.8636 116.1353 0.99247659 2698
GPS BII-19
1 22581U 93 17 A 93240.36107187 -.00000025 00000-0 99999-4 0 313
2 22581 54.9688 29.4541 0041262 36.1964 324.0904 2.00557519 3086
ProgressM17
1 22588U 93 19 A 93245.53521756 .00009713 00000-0 97070-4 0 1421
2 22588 51.6189 189.9500 0005409 55.0798 305.0745 15.65604033 24251
ARSENE
1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
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2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
GPS BII-20
1 22657U 93 32 A 93243.48577982 -.00000025 00000-0 99999-4 0 358
2 22657 55.0156 29.1172 0058766 198.7807 161.0015 2.00576267 5813
GPS BII-21
1 22700U 93 42 A 93241.46091332 -.00000007 00000-0 99999-4 0 275
2 22700 54.7079 270.0895 0024257 295.2486 64.5626 2.00567880 1233
Soyuz TM-17
1 22704U 93244.78754270 .00018701 00000-0 23707-3 0 65
2 22704 51.6201 194.7122 0005018 50.4319 309.7497 15.59485428 9711
Molniya3-45
1 22729U 93 49 A 93242.87920571 -.00000068 00000-0 99999-4 0 328
2 22729 62.8501 271.0852 7431423 280.5355 10.7498 2.00627121 553
1993 049D
1 22732U 93 49 D 93244.26611211 .00000205 00000-0 10954-3 0 173
2 22732 62.8438 270.7014 7389767 280.4223 11.0276 2.05826327 594
1993 047C
1 22733U 93 47 C 93245.20252593 .00384071 -18800-5 24560-3 0 741
2 22733 82.2948 49.0303 0025880 263.6395 96.1664 16.16680955 6722
NOAA 13
1 22739U 93244.58310993 -.00000762 00000-0 -41499-3 0 205
2 22739 98.9091 185.6557 0009520 209.6198 150.4592 14.10848607 3265
1993 050B
1 22740U 93 50 B 93245.37302383 .00001037 00000-0 60486-3 0 151
2 22740 98.9073 186.4079 0004819 127.3833 232.7778 14.10297651 3372
Cosmos 2261
1 22741U 93 51 A 93244.57297243 -.00001091 00000-0 99999-4 0 313
2 22741 62.8990 128.7198 7367269 318.2525 4.7481 2.00650143 447
1993 051B
1 22742U 93 51 B 93244.90017368 .00396162 93659-5 72491-3 0 330
2 22742 62.8205 49.0999 0199844 119.6122 242.4940 15.74002814 3470
1993 051C
1 22743U 93 51 C 93246.20404331 .06473092 42076-4 52370-3 0 701
2 22743 62.8484 41.6667 0055480 118.4165 242.9201 16.31820771 3728
ProgressM19
1 22745U 93 52 A 93243.95448532 .00000355 00000-0 75961-5 0 199
2 22745 51.6185 198.9024 0005154 41.1181 319.0711 15.59447673 3299
RESURS F-19
1 22777U 93 53 A 93245.53730290 .00071950 00000-0 47349-4 0 249
2 22777 82.5893 150.8313 0009833 250.7470 109.2643 16.17040502 1474
GPS BII-22
1 22779U 93 54 A 93244.36686008 .00001484 14604-4 99999-4 0 50
2 22779 34.8450 321.0530 6053544 194.5596 134.5472 4.03979475 96
1993 054B
1 22780U 93 54 B 93245.57700068 .00002565 00000-0 13222-3 0 44
2 22780 22.0442 299.9882 0193462 220.6822 137.9041 14.93656443 458
1993 054C
1 22781U 93 54 C 93246.08826273 .00061001 14448-4 18478-2 0 52
2 22781 34.8254 319.8231 6045310 196.3256 129.3070 4.05067943 163
Meteor 2-21
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1 22782U 93 55 A 93244.84606084 .00005435 00000-0 49569-2 0 84
2 22782 82.5442 74.9334 0021661 315.9639 44.0690 13.82988141 233
1993 055B
1 22783U 93 55 B 93245.49696173 -.00006297 00000-0 -57613-2 0 49
2 22783 82.5453 74.4145 0022221 312.4266 47.4925 13.83132928 325
1993 055C
1 22784U 93 55 C 93245.49697046 -.00000717 00000-0 -66006-3 0 71
2 22784 82.5456 74.4170 0021144 314.3807 45.7590 13.83096659 321
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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147. Question on DSP 2232 from AEA

Newsgroup: rec.radio.amateur.space
Date: 1993-09-04 19:32:15 UTC
From: psmith@convex.com
Message-ID: <1993Sep4.193215.15843@news.eng.convex.com>
Source record: 28852

In looking through the manual for the DSP 2232 it claims that the doppler up/down function has still not been implemented in this unit. I don't have a Kansas City Tracker or any other unit to track the doppler of the pacsat passes. So a couple of questions:

1. Is this still true or is there a newer version of the unit (or ROM) that has this implemented?

2. If it's true, how do you get around this limitation of the unit if you are using it, other than the obvious of having the Kansas City Tracker for example.

I'm still using a Tiny-2/PSK-1 combo...but was going to upgrade...until I saw this in the manual...

Any suggestions or information would be most appreciated.

73 Presley N5VGC psmith@convex.com

148. help

Newsgroup: rec.radio.amateur.space
Date: 1993-09-05 19:50:28 UTC
From: kd6oat@kd6oat.ampr.ORG
Message-ID: <594@kd6oat.ampr.org>
Source record: 28853

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help
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149. ANS-248 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-06 02:09:57 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-248.01@ampr.org>
Source record: 28859
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-248.01
CHILEAN MICROSAT STATUS

HR AMSAT NEWS SERVICE BULLETIN 248.01 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-248.01

More Information About The Chilean MICROSAT

ANS has received additional clarifying information on CESAR-1 which was the subject of an ANS bulletin released 14-AUG-1993. CESAR-1 is a 100% amateur radio satellite project being constructed by AMSAT-CE. Contrary to other reports, the Chilean Air Force has no participation in it. The MICROSAT type satellite is being built under an agreement between AMSAT-NA and AMSAT-CE under which AMSAT-NA is providing AMSAT-CE with basic information regarding the MICROSAT design, and rendering any possilble assistance when needed. AMSAT-CE estimates the total cost of completing its first satellite project at around $1M US DOLLARS! This amount includes more than merely the cost of building CESAR-1 but represents the total outlay needed to establish the necessary infrastructure to accomplish the task. To appreciate this, one must consider that the newly established Chilean AMSAT group exists in an environment much different than in most countries in which satellites have been built. There are no aerospace companies with employees who are radio amateurs. Therefore AMSAT-CE must set up its own laboratory and machine shop and train people to man them; and parts must procured. All of this requires the mounting of a fund raising campaign to publicize the project within Chile, including travel within the country to raise the interest of hams and the general public. Understandably, alot of Chileans are somewhat skeptical of the concept of a Chilean radio amateur satellite. The money raised, so far, is mainly based on personal contrib-utions by members of AMSAT-CE. The organization has only one paid em-ployee, a part time secretary. Everyone else in the team are volunteers, all of them licensed hams. With this information in mind, AMSAT-CE can be considered to be in the best tradition of other AMSAT-OSCAR projects in various countries. Once more, they are trying to accomplish a difficult task in the environment of a country that is making efforts to shed the image of a "underdeveloped" nation.

CESAR-1 will be a typical MICROSAT to which the builders expect to add a GPS receiver and digital voice transponder experiments. The latter will receive an L-Band uplink and transmit an S-Band downlink. Among other applications, this experiment will allow terrestrial repeaters to be linked via the satellite. The present plan calls for completion of a flight unit

by January '96

[The AMSAT News Service (ANS) would like to thank Eduardo Diaz (CE3GA) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-248.02
ITAMSAT TELEMETRY COEFFICIENTS

HR AMSAT NEWS SERVICE BULLETIN 248.02 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-248.02

ITAMSAT Telemetry Coefficient

Following is a coefficient file for the telemetry channels of ITAMSAT. Alberto (I2KBD) reports the launch is presently scheduled for 25-SEP-1993 at 01:27 UTC. ITAMSAT will start out with a callsign of ITAMSAT, and change to IY2SAT when BBS operations are initiated. Writers of telemetry decoders will want to note that this file may not be precisely in the "standard" MICROSAT format and their programs will need to recognize both callsigns.

This file has been uploaded to CI$, hamnet, library 5.

WD0E will attempt to have an updated TLMDCII out prior to this launch, that will recognize this bird, but that may not be possible given other commitments.

Martha, at AMSAT HQ, will have this file available both as hard copy and on disk in about a week or so. Telemetry aficionados will note some interesting items here:

- ch 15h is labeled RX frame temp. This is the same as on the current MICROSATs: the temp of the frame, in the receiver module, on the inside wall on the +X side.

There are temperature sensors on all four side solar panels and the -Z, not just the +Y. This is primarily to improve the source-side power management efficiency.

- Channels 2C through 2E will require clarification, but they may be simply different labels for the same channel numbers is the present MICROSATs, as the BCR is essentially identical.

- Note the -Z array temp at ch 35h

- Channels 3E through 41 will require clarification

- WD0E understand the IR sensor will have a narrower field of view than the present MICROSATs. Observing its varations when the +Z surface is earth pointing may be interesting.

0 Rx D DISC: +7.89403 -0.07355 0.000 kHz
1 Rx D S meter: +0.000 +1.000 0.000 Counts

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2 Rx C DISC: +8.70383 -0.07941 0.000 kHz
3 Rx C S meter: +0.000 +1.000 0.000 Counts
4 Rx B DISC: +9.24064 -0.08231 0.000 kHz
5 Rx B S meter: +0.000 +1.000 0.000 Counts
6 Rx A DISC: +9.78829 -0.08761 0.000 kHz
7 Rx A S meter: +0.000 +1.000 0.000 Counts
8 Rx E DISC: +9.47641 -0.08615 0.000 kHz
9 Rx E S meter: +0.000 +1.000 0.000 Counts
A +5V (Rx) Bus: +0.000 +0.03235 0.000 Volt
B +5V Rx Current:+0.000 +0.000250 0.000 Ampere
C +2.5V VREF: +0.000 +0.01128 0.000 Volt
D 8.5V (Rx) Bus: +0.000 +0.04497 0.000 Volt
E +Z IR Detector:+0.000 +1.000 0.000 Counts
F LO Monitor I: +0.000 +0.000037 0.000 Ampere
10 +10V (Rx) Bus: +0.000 +0.053557 0.000 Volt
11 GASFET Bias I: +0.000 +0.000026 0.000 Ampere
12 Ground REF: +0.000 +0.010000 0.000 Volt
13 +Z Array V: +0.000 +0.10381 0.000 Volt
14 Rx Temp: +95.246 -0.62071 0.000 Degree
15 +X Frame Temp: +95.246 -0.62071 0.000 Degree
16 Bat 1 V: +1.8013 -0.00364 0.000 Volt
17 Bat 2 V: +1.8013 -0.00364 0.000 Volt
18 Bat 3 V: +1.8013 -0.00364 0.000 Volt
19 Bat 4 V: +1.8013 -0.00364 0.000 Volt
1A Bat 5 V: +1.8013 -0.00364 0.000 Volt
1B Bat 6 V: +1.8013 -0.00364 0.000 Volt
1C Bat 7 V: +1.8013 -0.00364 0.000 Volt
1D Bat 8 V: +1.8013 -0.00364 0.000 Volt
1E Array V: +8.5018 +0.068273 0.000 Volt
1F +5V Bus: +0.958 +0.0312 0.000 Volt
20 +8.5V Bus: +6.862 +0.0184 0.000 Volt
21 +10V Bus: +8.1206 +0.022503 0.000 Volt
22 BCR Set Point: +4.0019 +1.1133 0.000 Set
23 +10V Bus Cur: +0.014641 +0.0043106 0.000 Ampere
24 +8.5V Bus Cur: +0.00234 +0.0007203 0.000 Ampere
25 +5V Bus Cur: -0.015 +0.0041667 0.000 Ampere
26 +X Array Cur: -0.008039 +0.0023219 0.000 Ampere
27 -X Array Cur: -0.008039 +0.0023219 0.000 Ampere
28 -Y Array Cur: -0.008039 +0.0023219 0.000 Ampere
29 +Y Array Cur: -0.008039 +0.0023219 0.000 Ampere
2A -Z Array Cur: -0.008039 +0.0023219 0.000 Ampere
2B +Z Array Cur: -0.008039 +0.0023219 0.000 Ampere
2C Trickle Cur: -0.008039 +0.0023219 0.000 Ampere
2D BCR Input Cur: -0.02593 +0.00339 0.000 Ampere
2E Bat Output Cur:-0.04936 +0.00418 0.000 Ampere
2F Bat 1 Temp: +95.246 -0.62071 0.000 Degree
30 Bat 2 Temp: +95.246 -0.62071 0.000 Degree
31 Baseplt Temp: +95.246 -0.62071 0.000 Degree
32 PSK TX RF Out: +0.007442 -0.0002794 0.000060 Watt
33 FM/PSK RF Out: +0.011771 +0.0025386 0.000054 Watt
```

34 PSK TX PA Temp:+95.246 -0.62071 0.000 Degree
35 -Z Array Temp: +95.246 -0.62071 0.000 Degree
36 FM/PSK PA Temp:+95.246 -0.62071 0.000 Degree
37 -Z Ext Temp: +95.246 -0.62071 0.000 Degree
38 +Z Array Temp: +95.246 -0.62071 0.000 Degree
39 -Y Frame Temp: +95.246 -0.62071 0.000 Degree
3A +X Array Temp: +95.246 -0.62071 0.000 Degree
3B +Y Array Temp: +95.246 -0.62071 0.000 Degree
3C -X Array Temp: +95.246 -0.62071 0.000 Degree
3D -Y Array Temp: +95.246 -0.62071 0.000 Degree
3E Earth sensor: +0.000 +1.000 0.000 Counts
3F Bat 3 Temp: +95.246 -0.62071 0.000 Degree
40 Separation sw: +0.000 +0.05 0.000 Volt
41 Spin sensor: +0.000 +1.000 0.000 Counts

[The AMSAT News Service would like to thank Alberto Zagni (I2KBD) and Jim White (WD0E) for making this data availble for this ANS bulletin.]

/EX
SB SAT @ AMSAT $ANS-248.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 248.03 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-248.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz

Date UTC Mode Phs NCS Alt NCS

11-Sep-93 1430 B 159 VE2LVC W9ODI
18-Sep-93 1515 B 96 N7NQM W5IU
2-Oct-93 1400 B 160 WA5ZIB WJ9F

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-248.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 248.04 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-248.04

Weekly OSCAR Status Reports: 04-SEP-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 16-Oct 25
Mode-B : MA 0 to MA 60 !
Mode-BS : MA 60 to MA 120 !<- after Aug 30 (hopefully)
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Alon/Alat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, 25-Oct-93
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-13 DX: LU8EBH says that he will be Asuncion, Paraguay from 11-SEP-93 until 15-SEP-93 operating AO-13 AMSAT-OSCAR-13 Mode-B using the call sign ZP0SAT or LU8EBH/ZP. Look for him on a downlink frecuency of 145.890 or 145.900 MHz. In early September he'll confirm the dates and callsign. On 30-AUG-93 at 13:58 UTC there took place the first QSO between Japan and countries in Zone 13 using AO-13 satellite. JG1TSG moved to Nosap Cape NE Japan for this purpose. Also active was JA8BY. Theye used the Mode-B. JG1TSG used 50 watts output, and his antennas consisted of a 12 element boom for 145 MHz and 26 elements for 435 MHz. LU8EBH used home brew rig with 25 watts output. His antennas were the KLM 40CX and 22C. Some minutes later, with about one or two degrees of elevation, the signals increased to S5-2. [LW2DTZ & LU8EBH]

AO-10: VE2LEZ reports that last weekend he was listening to AO-10 when he came upon an excellent DX station: 4MZMW0. And it turns out that this was VE2LEZ first contact on AO-13! He says that he made a contact with 4MZMW0 on a downlink frequency of 144.915 MHz. VE2LEZ says that the contact was difficult but challenging. [VE2LEZ @ VE2FKB]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: Operating normally. [WH6I]

AO-21: RUDAK-2 is now operating continously in the digital FM Mode only, no telemetry and no DigiVoice for the moment. So nothing is wrong with RUDAK. However, telemetry and DigiVoice will resume later this month and for

October, a special DigiVoice Experiment will be held. [DB2OS]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

150. nasa spacelink login

Newsgroup: rec.radio.amateur.space
Date: 1993-09-06 11:31:01 UTC
From: nolhier@laas.laas.fr
Message-ID: <nolhier-060993133317@gimli.laas.fr>
Source record: 28855

Regarding the next mission STS-58 of Columbia, I try to connect via
internet spacelink.msfc.nasa.gov with ftp like it was described on
SAREX Bulletin (May 1993). But this server refuse my connection with
anonymous login ?? I need some help please. 73's

151. APT-Satellites: Report SEP 04, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-09-07 07:09:54 UTC
From: peter.henne@gmd.de
Message-ID: <1993Sep7.070954.25019@gmd.de>
Source record: 28854
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, SEP 04, 1993

NOAA-9: APT 137.62 ON AGAIN!
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.40 ON *NEW*!
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

The *NEW* Meteor 2-21 transmits vis-APT on 137.40 MHz. During
Rev #57 and Rev #62 the signal-strength was amazingly weak,
hopefully this will become better in the future.
After NOAA-13 ist lost, NOAA-9 APT has been reactivated again,
transmitting very good illuminated images from late morning
descending passes.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

152. * SpaceNews 30-Aug-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-09-07 15:14:00 UTC
From: kd2bd@ka2qhd.ocpt.ccur.com
Message-ID: <$spc0830@ampr.org>
Source record: 28762
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC0830
* SpaceNews 30-Aug-93 *

BID: $SPC0830

=========
SpaceNews
=========

MONDAY AUGUST 30, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* MARS OBSERVER NEWS *
======================
NASA lost radio contact with its Mars Observer spacecraft on Saturday August 21, 1993, just days before it was expected to enter into a circular orbit 400 km above the surface of the planet. Orbit insertion was supposed to have occured on Tuesday August 24th at about 1:30 PM Pacific Daylight Time. The spacecraft was expected to begin global surface mapping of Mars on December 16th that would have lasted an entire Martian year of 687 Earth days.

Various attempts were made to re-establish contact with the spacecraft, but so far the Mars Observer has remained silent. NASA engineers believe a transistor in the satellite's clock failed, rendering the Mars Observer "brain-dead" and radio silent. It seems improbable that the spacecraft automatically entered into orbit around Mars, and probably missed its destination completely.

The Mars Observer was launched on September 25, 1992 on a Titan III rocket from Cape Canveral Air Force Station, Florida. On July 26, 1993 at 8:52 PM PDT, the Mars Observer returned its first image of Mars when it was 5.8 million kilometers from the red planet. That image was taken using the spacecraft's high resolution, narrow angle telescopic camera.

In 1976 an unmanned NASA Viking spacecraft sucessfully photographed the surface of Mars from an altitude of approximately 1700 kilometers. The objective of the Viking mission was to search for evidence of intelligent life on Mars, either now or in the past. Image 35A72 taken by Viking-1 and received by the Jet Propulsion Lab showed a mile-long, 1500 foot high humanoid "face" staring into eternity on the surface of Mars. It was later dismissed without investigation by NASA as a "trick of light and shadow" and filed away. Frame 70A13 taken over the same area with a higher sun-angle showed the same feature in addition to a pyramid-like structure approximately

16 kilometers southwest of the "face".

In 1980, Vicent DiPietro and Gregory Molenaar, imaging engineers under contract to NASA's Goddard Space Flight Center on another project, stumbled across these Viking images. After further investigation they discovered folds and horizontal stripes on the "headpiece" or "helmet" of the face which resembled those of Egyptian Pharaohs, symmetrical cheekbones, an eye socket, eyeball, and pupil, nose, mouth, and teeth. The facial proportions were found to be similar to those of early man. DiPietro and Molenaar published their findings and conclusions in 1980 and were stonewalled by the planetary science community for doing so.

In a feature article in "Soviet Life" magazine published in 1984, the Russians revealed their own fascination with the Martian "sphinx" and five-sided pyramids found in the Viking photos.

In an effort to carry out their own investigations, the former USSR launched Phobos I and Phobos II, two unmanned satellites to the planet Mars on July 12, 1988. The reason for launching two craft was for redundancy in case one malfunctioned. Phobos I was lost after it received a bad command during its journey to Mars and fell silent when controllers tried to re-acquire it on the way. Phobos II arrived in January 1989 and entered an orbit around Mars as the first phase towards its real destination, a small Martian moon called Phobos. The mission was flawless until the craft aligned itself with Phobos. On March 28, 1989, an elliptical object was detected to be moving towards the satellite seconds before it failed. All indications were that the elliptical object had collided with the satellite which was now dead and left spinning out of control.

On March 28, 1989 Tass, the official Soviet news agency stated: "Phobos II failed to communicate with Earth as scheduled after completing an operation yesterday around the Martian moon Phobos. Scientists at mission control have been unable to establish stable radio contact."

The next day a top official of the Soviet Space Agency (Glavkosmos) stated: "Phobos II is 99% lost for good." It is important to note that he stated the entire satellite was gone and not that just radio contact was lost with it.

On March 30, 1989 at 4:41 PM EST, the Associated Press released the following statement: "Soviet research centers are now trying to interpret so far 'unexplained optical phonomena' on the pictures of the Martian surface. The pictures show an inigmatic strip 23-25 miles wide and a large spindle-shaped formation."

On March 31, 1989 headlines dispatched by the Moscow correspondents of the European News Agency (EFE) stated: "Phobos 2 Captured Strange Photos of Mars Before Losing Contact With It's Base. Vremya revealed yesterday that the space probe Phobos II, which was orbiting above Mars when Soviet scientists lost contact with it on Monday, had photographed an unidentified object on the Martian surface seconds before losing contact." Scientists described the unidentified object as a thin ellipse 20 kilometers in length.

It was further stated that the photos could not be an illusion because they were captured by 2 different color cameras as well as cameras taking infrared shots.

One controller at the Kaliningrad control center concluded that the Phobos II probe was left spinning out of control, a result of being struck or shot. In the October 19, 1989 issue of Nature Magazine, Soviet scientists concluded that the craft could be spinning because it was impacted.

Not since the NASA Viking missions in 1976 has there been a successful unmanned mission to Mars. NASA's Mars Observer is simply the latest in a series of spacecraft destined for Mars that failed unexpectedly just prior to reaching the planet.

The mystery continues.

* ITAMSAT NEWS *
==========
On Friday August 13th, the Ariane 49 launch vehicle was rolled out of the assembly building and moved to its launch pad. On Monday August 16th, the ITAMSAT spacecraft was mated on the ASAP plattform in its final flight configuration. The bolt cutter and separation spring was installed and the umblical cable connected to the launch vehicle bus. Due to the uncertainly of the launch date, the team decided to launch ITAMSAT in an off configuration with the battery fully charged, but not connected to the payloads until after separation. Thus no trickle charge is required and on J-0 a full battery charging will be performed, on J-5 the fairing containing the ASAP and the Spot-3 will be closed and moved on the top of the Ariane launcher.

The Ariane launch has been delayed and has now been set for 24-Sep-93. Further short-term delays are also possible.

[Info via I1ZCT]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

K0BJ I1ZCT KZ1Z IW2BSF OE3ACC LU7AKC N7VQO PS7KM

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
UUCP : ...catfish.ocpt.ccur.com!ka2qhd!kd2bd
PACKET : KD2BD @ NN2Z.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology

Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

153. * SpaceNews 06-Sep-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-09-07 15:24:44 UTC
From: kd2bd@ka2qhd.ocpt.ccur.com
Message-ID: <$spc0906@ampr.org>
Source record: 28761
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC0906
* SpaceNews 06-Sep-93 *

BID: $SPC0906

=========
SpaceNews
=========

MONDAY SEPTEMBER 6, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* NOAA-13 NEWS *
================
Satellite controllers lost contact with the NOAA-13 satellite on Saturday 21-Aug-93, and preliminary indications are that the spacecraft's power system is not working, according to officials at NASA and the National Oceanic and Atmospheric Administration.

All battery charging aboard the satellite ceased at approximately 3:45 PM EDT 21-Aug-93, according to Charles E. Thienel, Meteorological Satellites Project Manager at NASA's Goddard Space Flight Center, Greenbelt, Maryland. Contact with the spacecraft during subsequent ground passes showed steadily decreasing battery voltages and currents, he said.

Output from the solar arrays continued to be normal, Thienel said, indicating a failure in the circuitry between the solar arrays and the batteries. There has been no contact with the spacecraft since approximately 7:15 PM EDT 21-Aug-93.

The spacecraft was launched by the U.S. Air Force from Vandenberg Air Force Base, California on 09-Aug-93. Spacecraft operations were turned over to NOAA on 12-Aug-93 as a part of planned checkout procedures. Instrument checkouts were continuing at the time of the failure.

NOAA-13 is the newest in a series of polar-orbiting weather satellites. It is designed to monitor the Earth's ocean and atmosphere. It collects meteorological and ocean data for direct transmission to users around the world and to central data processing centers.

NOAA-11, which NOAA-13 was planned to replace, was launched in September 1988 and NOAA-12 in May 1991. Both are providing environmental data to users around the world. NOAA officials said the problem with NOAA-13 would not affect weather coverage. Instruments on NOAA-11 and NOAA-12 are providing

full coverage. NOAA-13 was called up to ensure continuity of data because of degradation in NOAA-11's instruments and spacecraft subsystems.

The spacecraft was built by Martin Marietta Astro Space in East Windsor, NJ. The spacecraft completed its initial functional and environmental testing in early 1990. The spacecraft then was held in standby with routinely scheduled aliveness testing until March 1993, when it went through complete functional checkout in preparation for launch.

[Info via NASA]

* FO-20 SCHEDULE *
==========
The following is the latest FO-20 mode JA transponder schedule from the JARL:

01-Sep-93 09:05 through 02-Sep-93 09:25 UTC
08-Sep-93 09:30 through 09-Sep-93 07:58 UTC
22-Sep-93 08:30 through 24-Sep-93 09:05 UTC
29-Sep-93 08:50 through 30-Sep-93 09:11 UTC

There will be no planned Mode JA operations on 15-Sep-93 so there are two Mode JA days the following week starting the 22nd.

[Info via 73 Richard, G3RWL]

* OPERATION ASSIST *
==========
Helmut, DG5MFX, would like some information on how he might receive CCD images from amateur satellites UO-22 and KO-23. Helmut can be reached on packet at: DG5MFX @ DB0MWE.BAV.GER.EU.

Dean, ZP6XD, is having difficulty accessing the UO-22 and KO-23 satellites using an AEA DSP-2232 packet radio TNC. He believes his problem may lie in the interconnection between his TNC and his ground station radio equipment. Dean may be reached at:

J. Dean Moore, ZP6XD
P.O. Box 2320
Asuncion, Paraguay

Jim, N7IJS, would like some information on synthetic aperture radar, and in particular, SAR images of forests and other types of lands. He would also like to know what radio frequencies are involved in SAR, the orbital characteristics of SAR satellites, the sensitivity with various materials, the performance through tree cover, the ground-penetrating characteristics, etc. Jim may be reached at:

Jim Bell, N7IJS
7214 Corregidor
Vancouver, Washington 98664
U.S.A.

* SCHOOL DAYS *
==========

```
////
(o o)
*-----------------------------------------oOO--(_)--OOo---*
| |
| We hope that you had a great summer. The school year |
| ahead is ripe with opportunities for personal and |
| academic growth. The BEARS wish you a fantastic |
| school year filled with ham radio fun. |
| |
| 73 Pete, KZ1Z and The BEARS |
| |
| Bethel Educational Amateur Radio Society |
| Bethel Middle School |
| Bethel, Connecticut |
| |
*------------------------------------------------------------*

* THANKS! *
===========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

KZ1Z DG5MFX N7IJS ZP6XD

* FEEDBACK/INPUT WELCOMED *
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<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
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Advanced Technology Center |/\/\/\| Packet : KD2BD @ NN2Z.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..
```

154. Re: nasa spacelink login

Newsgroup: rec.radio.amateur.space
Date: 1993-09-07 16:36:21 UTC
From: johnrs@mdis.co.uk
Message-ID: <CCzssM.AC2@mdis.co.uk>
Source record: 28856

Nicolas NOLHIER (F1MDY) (nolhier@laas.laas.fr) wrote:
: Regarding the next mission STS-58 of Columbia, I try to connect via
: internet spacelink.msfc.nasa.gov with ftp like it was described on
: SAREX Bulletin (May 1993). But this server refuse my connection with
: anonymous login ?? I need some help please. 73's

I think that spacelink is telnet only, so I suggest that you try
telnet spacelink.msfc.nasa.gov. You should get the bbs then. If you
want to download files you will need kermit, otherwise you can view
the files and capture the screens.

Hope this helps

73 John
--

John Sniadowski G4BRH jsniadowski@mdis.co.uk (Work)
Voice: +44 (0)442 272224 johnrs@snoopy.demon.co.uk (Home)
Fax: +44 (0)442 234443 Compuserve: 100014,3202

155. need lastest KEPS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-08 01:48:58 UTC
From: da884@cleveland.Freenet.Edu
Message-ID: <26jdmb$3ee@usenet.INS.CWRU.Edu>
Source record: 28763

Could someone tell me where or send me a copy of the lastest KEPS,
what I really is is just AO-21 and MIR.

Thanks.

156. Re: nasa spacelink login

Newsgroup: rec.radio.amateur.space
Date: 1993-09-08 17:31:59 UTC
From: burke_br@adcae1.comm.mot.com
Message-ID: <1993Sep8.173159.555@lmpsbbs.comm.mot.com>
Source record: 28766

Spacelink has both telnet and ftp sites, they are addressed the same
when connecting, but appear to be two different systems once on.
There is also a phone number: (208) 895-0028, this gets you
the "telnet" site.

On the ftp side, the login is anonymous, and password is guest.
On the telnet side, follow the instructions given.

Good Luck, 73,

Bruce, WB4YUC, el YUCCO. . .

157. Pictures

Newsgroup: rec.radio.amateur.space
Date: 1993-09-09 18:13:02 UTC
From: jtdickin@ouray
Message-ID: <7419@copper.Denver.Colorado.EDU>
Source record: 28767

Does anyone know where I can get any good Sat photo's of Denver area?
Looking for close ups to be able to make out a car as resolution...

158. InstantTrack on QRZ Cdrom?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 02:21:25 UTC
From: gws@n8emr.cmhnet.org
Message-ID: <1993Sep10.022125.18292@n8emr.cmhnet.org>
Source record: 28769

Is the InstantTrack V1.0 software by Franklin Antonio
now a free distributable software package? I thought
it was shareware. I picked up the QRZ cdrom and found
it in the misc/dl_files directory as it_track.exe

--
Gary W. Sanders gws@n8emr.cmhnet.org, 72277,1325
N8EMR @ N8JYV (ip addr) 44.70.0.1 [Ohio AMPR address coordinator]
HAM BBS 614-895-2553 (1200/2400/V.32/PEP) Voice: 614-895-2552 (eves/weekends)

159. ORBS$254.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 16:06:03 UTC
From: Richard Campbell <G_RCAMPBELL@qualcomm.com>
Message-ID: <$orbs-254.o@ampr.org>
Source record: 28782
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-254.O
Orbital Elements 254.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX September 11, 1993
BID: $ORBS-254.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93252.14596194
Element set: 31
Inclination: 27.1228 deg
RA of node: 6.8063 deg
Eccentricity: 0.6019942
Arg of perigee: 112.6420 deg
Mean anomaly: 319.5979 deg
Mean motion: 2.05881118 rev/day
Decay rate: -1.9e-07 rev/day^2
Epoch rev: 7699
Checksum: 304

Satellite: UO-11
Catalog number: 14781
Epoch time: 93252.62257785
Element set: 436
Inclination: 97.8065 deg
RA of node: 275.2719 deg
Eccentricity: 0.0013040
Arg of perigee: 84.8344 deg
Mean anomaly: 275.4348 deg
Mean motion: 14.69050904 rev/day
Decay rate: 1.94e-06 rev/day^2
Epoch rev: 50911
Checksum: 317

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93250.83641687
Element set: 646
Inclination: 82.9296 deg
RA of node: 177.5295 deg
Eccentricity: 0.0013237
Arg of perigee: 86.9823 deg
```

Mean anomaly: 273.2832 deg
Mean motion: 13.72322704 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 31118
Checksum: 325

Satellite: AO-13
Catalog number: 19216
Epoch time: 93248.11188782
Element set: 640
Inclination: 57.8725 deg
RA of node: 296.4305 deg
Eccentricity: 0.7209128
Arg of perigee: 323.5639 deg
Mean anomaly: 4.5101 deg
Mean motion: 2.09723332 rev/day
Decay rate: -1.82e-06 rev/day^2
Epoch rev: 4003
Checksum: 289

Satellite: FO-20
Catalog number: 20480
Epoch time: 93250.03648670
Element set: 455
Inclination: 99.0294 deg
RA of node: 90.6876 deg
Eccentricity: 0.0539922
Arg of perigee: 261.2006 deg
Mean anomaly: 92.7624 deg
Mean motion: 12.83220718 rev/day
Decay rate: -1.5e-07 rev/day^2
Epoch rev: 16781
Checksum: 304

Satellite: AO-21
Catalog number: 21087
Epoch time: 93252.78022822
Element set: 846
Inclination: 82.9471 deg
RA of node: 350.2226 deg
Eccentricity: 0.0036162
Arg of perigee: 143.7444 deg
Mean anomaly: 216.6152 deg
Mean motion: 13.74524350 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 13106
Checksum: 279

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93252.51911169

Element set: 420
Inclination: 82.9210 deg
RA of node: 219.5687 deg
Eccentricity: 0.0028528
Arg of perigee: 167.2634 deg
Mean anomaly: 192.9250 deg
Mean motion: 13.74026208 rev/day
Decay rate: 1.7e-07 rev/day^2
Epoch rev: 13010
Checksum: 286

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93241.80475365
Element set: 21
Inclination: 1.3018 deg
RA of node: 119.8566 deg
Eccentricity: 0.2933615
Arg of perigee: 152.1382 deg
Mean anomaly: 232.4293 deg
Mean motion: 1.42202460 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 162
Checksum: 258

/EX
SB KEPS @ AMSAT $ORBS-254.D
Orbital Elements 254.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX September 11, 1993
BID: $ORBS-254.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93253.09988253
Element set: 769
Inclination: 98.6106 deg
RA of node: 336.4238 deg
Eccentricity: 0.0010457
Arg of perigee: 297.7530 deg
Mean anomaly: 62.2592 deg
Mean motion: 14.29790671 rev/day
Decay rate: 4.9e-07 rev/day^2
Epoch rev: 18956
Checksum: 343

Satellite: AO-16
Catalog number: 20439
Epoch time: 93250.29736562
Element set: 573

Inclination: 98.6180 deg
RA of node: 334.6079 deg
Eccentricity: 0.0010731
Arg of perigee: 307.3671 deg
Mean anomaly: 52.6525 deg
Mean motion: 14.29848359 rev/day
Decay rate: 2.7e-07 rev/day^2
Epoch rev: 18917
Checksum: 326

Satellite: DO-17
Catalog number: 20440
Epoch time: 93249.78921203
Element set: 575
Inclination: 98.6188 deg
RA of node: 334.3400 deg
Eccentricity: 0.0010895
Arg of perigee: 309.1192 deg
Mean anomaly: 50.8999 deg
Mean motion: 14.29984707 rev/day
Decay rate: 2.6e-07 rev/day^2
Epoch rev: 18911
Checksum: 329

Satellite: WO-18
Catalog number: 20441
Epoch time: 93250.24967426
Element set: 577
Inclination: 98.6187 deg
RA of node: 334.8166 deg
Eccentricity: 0.0011530
Arg of perigee: 306.9709 deg
Mean anomaly: 53.0417 deg
Mean motion: 14.29963819 rev/day
Decay rate: 2.6e-07 rev/day^2
Epoch rev: 18918
Checksum: 330

Satellite: LO-19
Catalog number: 20442
Epoch time: 93250.80611034
Element set: 574
Inclination: 98.6190 deg
RA of node: 335.5593 deg
Eccentricity: 0.0011879
Arg of perigee: 305.2600 deg
Mean anomaly: 54.7469 deg
Mean motion: 14.30054974 rev/day
Decay rate: 3.8e-07 rev/day^2
Epoch rev: 18927
Checksum: 309

Satellite: UO-22
Catalog number: 21575
Epoch time: 93251.25283909
Element set: 273
Inclination: 98.4670 deg
RA of node: 326.0047 deg
Eccentricity: 0.0008706
Arg of perigee: 53.3856 deg
Mean anomaly: 306.8113 deg
Mean motion: 14.36848757 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 11259
Checksum: 311

Satellite: KO-23
Catalog number: 22077
Epoch time: 93249.13704215
Element set: 114
Inclination: 66.0790 deg
RA of node: 154.7002 deg
Eccentricity: 0.0000483
Arg of perigee: 354.1910 deg
Mean anomaly: 5.9105 deg
Mean motion: 12.86279206 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5025
Checksum: 242

/EX
SB KEPS @ AMSAT $ORBS-254.W
Orbital Elements 254.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX September 11, 1993
BID: $ORBS-254.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93252.66476692
Element set: 456
Inclination: 99.0931 deg
RA of node: 294.2753 deg
Eccentricity: 0.0014327
Arg of perigee: 292.8300 deg
Mean anomaly: 67.1355 deg
Mean motion: 14.13543551 rev/day
Decay rate: 6.3e-07 rev/day^2
Epoch rev: 45071
Checksum: 310

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93252.61947196
Element set: 298
Inclination: 98.5169 deg
RA of node: 265.1293 deg
Eccentricity: 0.0014348
Arg of perigee: 69.0409 deg
Mean anomaly: 291.2306 deg
Mean motion: 14.24830389 rev/day
Decay rate: 3.6e-07 rev/day^2
Epoch rev: 36265
Checksum: 336

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93252.08192517
Element set: 885
Inclination: 82.5457 deg
RA of node: 132.2036 deg
Eccentricity: 0.0015270
Arg of perigee: 252.8972 deg
Mean anomaly: 107.0516 deg
Mean motion: 13.84693024 rev/day
Decay rate: 4.8e-07 rev/day^2
Epoch rev: 28345
Checksum: 307

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93251.83759383
Element set: 59
Inclination: 82.5448 deg
RA of node: 162.7690 deg
Eccentricity: 0.0015844
Arg of perigee: 248.4829 deg
Mean anomaly: 111.4604 deg
Mean motion: 13.16961076 rev/day
Decay rate: 4.4e-07 rev/day^2
Epoch rev: 24622
Checksum: 320

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93252.93535630
Element set: 207
Inclination: 99.1409 deg
RA of node: 230.4459 deg
Eccentricity: 0.0011303
Arg of perigee: 197.2748 deg
Mean anomaly: 162.8022 deg
Mean motion: 14.12913423 rev/day
Decay rate: 9.9e-07 rev/day^2

Epoch rev: 25564
Checksum: 292

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93251.84982775
Element set: 823
Inclination: 82.5194 deg
RA of node: 8.2129 deg
Eccentricity: 0.0013581
Arg of perigee: 301.8397 deg
Mean anomaly: 58.1440 deg
Mean motion: 13.84342314 rev/day
Decay rate: 2.0e-07 rev/day^2
Epoch rev: 22876
Checksum: 311

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93252.12513532
Element set: 732
Inclination: 82.5517 deg
RA of node: 105.6679 deg
Eccentricity: 0.0014503
Arg of perigee: 268.3880 deg
Mean anomaly: 91.5581 deg
Mean motion: 13.16023509 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18614
Checksum: 278

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93252.04177880
Element set: 575
Inclination: 82.5440 deg
RA of node: 71.7864 deg
Eccentricity: 0.0014728
Arg of perigee: 214.8751 deg
Mean anomaly: 145.1448 deg
Mean motion: 13.84178755 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 16172
Checksum: 316

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93252.08446190
Element set: 626
Inclination: 98.8547 deg
RA of node: 275.9425 deg

Eccentricity: 0.0016776
Arg of perigee: 76.4064 deg
Mean anomaly: 283.8969 deg
Mean motion: 14.01292291 rev/day
Decay rate: -3.5e-07 rev/day^2
Epoch rev: 15433
Checksum: 336

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93250.40374893
Element set: 579
Inclination: 82.5240 deg
RA of node: 10.9651 deg
Eccentricity: 0.0013864
Arg of perigee: 114.8917 deg
Mean anomaly: 245.3686 deg
Mean motion: 13.83556587 rev/day
Decay rate: 1.9e-07 rev/day^2
Epoch rev: 14865
Checksum: 326

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93250.74892324
Element set: 399
Inclination: 82.5444 deg
RA of node: 9.2674 deg
Eccentricity: 0.0013524
Arg of perigee: 166.2305 deg
Mean anomaly: 193.9207 deg
Mean motion: 13.16453983 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11419
Checksum: 297

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93253.07862788
Element set: 663
Inclination: 98.6511 deg
RA of node: 281.6136 deg
Eccentricity: 0.0012857
Arg of perigee: 333.3910 deg
Mean anomaly: 26.6591 deg
Mean motion: 14.22308304 rev/day
Decay rate: 1.39e-06 rev/day^2
Epoch rev: 12071
Checksum: 292

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93252.61433586
Element set: 456
Inclination: 82.5522 deg
RA of node: 314.8855 deg
Eccentricity: 0.0012653
Arg of perigee: 174.5167 deg
Mean anomaly: 185.6096 deg
Mean motion: 13.16823432 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 9953
Checksum: 317

/EX
SB KEPS @ AMSAT $ORBS-254.M
Orbital Elements 254.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX September 11, 1993
BID: $ORBS-254.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93252.47687747
Element set: 290
Inclination: 51.6201 deg
RA of node: 156.0540 deg
Eccentricity: 0.0004730
Arg of perigee: 72.6014 deg
Mean anomaly: 287.4782 deg
Mean motion: 15.59620308 rev/day
Decay rate: 5.54e-06 rev/day^2
Epoch rev: 43228
Checksum: 293

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93252.79854265
Element set: 176
Inclination: 28.4707 deg
RA of node: 238.9236 deg
Eccentricity: 0.0004592
Arg of perigee: 210.9980 deg
Mean anomaly: 149.0331 deg
Mean motion: 14.92821489 rev/day
Decay rate: 4.91e-06 rev/day^2
Epoch rev: 18417
Checksum: 319

Satellite: GRO
Catalog number: 21225

Epoch time: 93251.77629519
Element set: 985
Inclination: 28.4611 deg
RA of node: 46.3605 deg
Eccentricity: 0.0007171
Arg of perigee: 178.5008 deg
Mean anomaly: 181.5672 deg
Mean motion: 15.76061775 rev/day
Decay rate: 4.337e-05 rev/day^2
Epoch rev: 1330
Checksum: 298

Satellite: UARS
Catalog number: 21701
Epoch time: 93247.37464806
Element set: 255
Inclination: 56.9828 deg
RA of node: 224.1299 deg
Eccentricity: 0.0003966
Arg of perigee: 86.4471 deg
Mean anomaly: 273.7082 deg
Mean motion: 14.96117854 rev/day
Decay rate: -7.72e-06 rev/day^2
Epoch rev: 10815
Checksum: 323

/EX

160. * SpaceNews 13-Sep-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 16:51:24 UTC
From: John Magliacane <kd2bd@ka2qhd.ocpt.ccur.com>
Message-ID: <$spc0913@ampr.org>
Source record: 28781
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB NEWS @ AMSAT $SPC0913
* SpaceNews 13-Sep-93 *

BID: $SPC0913

=========
SpaceNews
=========

MONDAY SEPTEMBER 13, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* ZRO TEST SCHEDULE *
====================
The ZRO Memorial Technical Achievement Award Program, or just "ZRO Test" has a new schedule for September and October, 1993, via AMSAT-OSCAR-13. This activity is a test of operating skill and equipment performance. Due to scheduling difficulties only three tests have been set up for this round, so be sure to mark the test dates and times on your calendar.

During a typical ZRO run, a control station will send numeric code groups using CW at 10 words-per-minute. At the beginning of the run, uplink power from the control station is set to match the general beacon downlink strength. This is level "zero". The control operator will send and repeat a random five-digit number, then lower his uplink power by 3 dB (half power) and repeat the procedure with a new random number. This will continue to a level 30 dB below the beacon (level "A").

A participating listener monitors the downlink signals till he can no longer copy the numbers. Those who can hear the beacon will qualify for the basic award by copying the code group heard at level "zero". The challenge is to improve home-station performance to a point where the lower-level downlink signals can be copied (levels 6 through A).

The following schedule of Mode "B" tests were chosen for convenient operating times and favorable squint angles. The tests can be heard on 145.840 MHz. Andy WA5ZIB will conduct all the tests. Mode "JL" tests will no longer occur due to the failure of A-O-13's 70-cm transmitter. Ed N5EM will be back next year after he completes station calibrations necessary to insure accurate Mode "B" activity. His "JL" tests were greatly appreciated.

Sunday Sep. 26, 1993 at 0545 UTC
Saturday Oct. 2, 1993 at 1335 UTC
Monday Oct. 18, 1993 at 0430 UTC

Note that the dates and days are shown in "UTC", thus the first and third tests shown occur in the late evening hours for those in North America. For example, the October 18th UTC test is at 11:30 PM CDT Sunday night (the 17th). Any changes will be announced as soon as possible via the AMSAT HF and A-O-13 Operations Nets.

ZRO brochures are available from WA5ZIB, Andy MacAllister, AMSAT V.P. User Operations, 14714 Knightsway Drive, Houston, TX 77083 for an S.A.S.E. with two units of postage. The brochure characterizes test procedures, means for obtaining certificates and gives some historical background about the program. New brochures were not made for the current round of tests, but this announcement and a graphical presentation of the satellite's view during the tests will be provided along with the March 1993 version of the brochure.

All listener reports with date of test and numbers copied should be sent to WA5ZIB at the address above. A report will be returned verifying the level of accurate reception.

[Info via Andy "WA5ZIB" MacAllister]

* FO-20 SCHEDULE *
==========
The following is the latest FO-20 mode JA transponder schedule from the JARL:

22-Sep-93 08:30 through 24-Sep-93 09:05 UTC
29-Sep-93 08:50 through 30-Sep-93 09:11 UTC

There will be no planned Mode JA operations on 15-Sep-93 so there are two Mode JA days the following week starting the 22nd.

[Info via 73 Richard, G3RWL]

* AO-21 NEWS *
==========
Peter, DB2OS, reports that AO-21 (RUDAK-2) is now operating continously in the digital FM Mode with no telemetry and no DigiVoice at present.

Telemetry and DigiVoice transmissions will resume again later this month and in October a special DigiVoice experiment will be held.

* STS-58 NEWS *
==========
The following Keplerian orbital data pertains to US Space Shuttle flight STS-58 currently scheduled for launch on 07-Oct-93.

STS-58
1 00058U 93280.67747791 .00119475 00000-0 26040-3 0 42
2 00058 39.0114 117.7673 0007676 272.4217 87.5676 15.96123499 26

Satellite: STS-58
Catalog number: 00058
Epoch time: 93280.67747791 = (07 OCT 93 16:15:34.09 UTC)
Element set: 004
Inclination: 39.0114 deg

RA of node: 117.7673 deg Space Shuttle Flight STS-58
Eccentricity: .0007676 Prelaunch Element set JSC-004
Arg of perigee: 272.4217 deg Launch: 07 OCT 93 14:53 UTC
Mean anomaly: 87.5676 deg
Mean motion: 15.96123499 rev/day Gil Carman, WA5NOM
Decay rate: 1.19475e-03 rev/day^2 NASA Johnson Space Center
Epoch rev: 2
Checksum: 325

[Info via Gil Carman, WA5NOM]

* THANKS! *
===========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

KB2OPQ VU2JHM N7CBK K9PVW N0RQV Karl Fogel Marshal Perlman

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

161. Satellite Tracking Software - Best?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 18:00:32 UTC
From: S1.RSW@ISUMVS.IASTATE.EDU
Message-ID: <CD5GoJ.DzD@news.iastate.edu>
Source record: 28768

Fellow Netters:

I'm sure this is probably a FAQ on this bb, however I'll keep
this short:

I'd like opinions/suggestions about what is the "best"
sttellite tracking program [DOS compatible] available today, BEST
in terms of ease of use, accuracy, and availability for IBM clone
use (memory requirements?). I would like to try some satellite work
(at least Mode A on RS-10 to start) to see how it works and if I
like it, however I am in need of a good tracking program for obvious
reasons. I have all necessary equipment for a Mode A station with
the exception of the software.

Your comments either by e-mail to s1.rsw@isumvs.iastate.edu
or posted on the bb would be helpful (sources of programs?).

Thanks in advance, and 73,

Rob Wallace, WA2SPO
Ames, Iowa

162. ORBS$254.2LINERS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 18:36:00 UTC
From: dick.CAmpbell@drig.COM
Message-ID: <$orbs-254.n@ampr.org>
Source record: 28784
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-254.N
2Line Orbital Elements 254.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX September 11, 1993
BID: $ORBS-254.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93252.14596194 -.00000019 00000-0 99999-4 0 318
2 14129 27.1228 6.8063 6019942 112.6420 319.5979 2.05881118 76999
UO-11
1 14781U 84 21 B 93252.62257785 .00000194 00000-0 36835-4 0 4368
2 14781 97.8065 275.2719 0013040 84.8344 275.4348 14.69050904509117
RS-10/11
1 18129U 87 54 A 93250.83641687 .00000088 00000-0 89554-4 0 6467
2 18129 82.9296 177.5295 0013237 86.9823 273.2832 13.72322704311189
AO-13
1 19216U 88 51 B 93248.11188782 -.00000182 00000-0 -12966-2 0 6405
2 19216 57.8725 296.4305 7209128 323.5639 4.5101 2.09723332 40033
FO-20
1 20480U 90 13 C 93250.03648670 -.00000015 00000-0 -44580-5 0 4551
2 20480 99.0294 90.6876 0539922 261.2006 92.7624 12.83220718167819
AO-21
1 21087U 91 6 A 93252.78022822 .00000085 00000-0 82656-4 0 8461
2 21087 82.9471 350.2226 0036162 143.7444 216.6152 13.74524350131064
RS-12/13
1 21089U 91 7 A 93252.51911169 .00000017 00000-0 11966-4 0 4205
2 21089 82.9210 219.5687 0028528 167.2634 192.9250 13.74026208130102
ARSENE
1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
UO-14
1 20437U 90 5 B 93253.09988253 .00000049 00000-0 26915-4 0 7691
2 20437 98.6106 336.4238 0010457 297.7530 62.2592 14.29790671189568
AO-16
1 20439U 90 5 D 93250.29736562 .00000027 00000-0 18246-4 0 5733
```

```
2 20439 98.6180 334.6079 0010731 307.3671 52.6525 14.29848359189177
DO-17
1 20440U 90 5 E 93249.78921203 .00000026 00000-0 17878-4 0 5756
2 20440 98.6188 334.3400 0010895 309.1192 50.8999 14.29984707189118
WO-18
1 20441U 90 5 F 93250.24967426 .00000026 00000-0 17991-4 0 5775
2 20441 98.6187 334.8166 0011530 306.9709 53.0417 14.29963819189186
LO-19
1 20442U 90 5 G 93250.80611034 .00000038 00000-0 22574-4 0 5742
2 20442 98.6190 335.5593 0011879 305.2600 54.7469 14.30054974189271
UO-22
1 21575U 91 50 B 93251.25283909 .00000051 00000-0 24141-4 0 2730
2 21575 98.4670 326.0047 0008706 53.3856 306.8113 14.36848757112592
KO-23
1 22077U 92 52 B 93249.13704215 .00000000 00000-0 99999-4 0 1144
2 22077 66.0790 154.7002 0000483 354.1910 5.9105 12.86279206 50250
NOAA-9
1 15427U 84123 A 93252.66476692 .00000063 00000-0 43483-4 0 4567
2 15427 99.0931 294.2753 0014327 292.8300 67.1355 14.13543551450711
NOAA-10
1 16969U 86 73 A 93252.61947196 .00000036 00000-0 23429-4 0 2984
2 16969 98.5169 265.1293 0014348 69.0409 291.2306 14.24830389362654
MET-2/17
1 18820U 88 5 A 93252.08192517 .00000048 00000-0 37200-4 0 8856
2 18820 82.5457 132.2036 0015270 252.8972 107.0516 13.84693024283451
MET-3/2
1 19336U 88 64 A 93251.83759383 .00000044 00000-0 99999-4 0 598
2 19336 82.5448 162.7690 0015844 248.4829 111.4604 13.16961076246228
NOAA-11
1 19531U 88 89 A 93252.93535630 .00000099 00000-0 63655-4 0 2076
2 19531 99.1409 230.4459 0011303 197.2748 162.8022 14.12913423255649
MET-2/18
1 19851U 89 18 A 93251.84982775 .00000020 00000-0 12607-4 0 8238
2 19851 82.5194 8.2129 0013581 301.8397 58.1440 13.84342314228766
MET-3/3
1 20305U 89 86 A 93252.12513532 .00000043 00000-0 99999-4 0 7325
2 20305 82.5517 105.6679 0014503 268.3880 91.5581 13.16023509186141
MET-2/19
1 20670U 90 57 A 93252.04177880 .00000015 00000-0 86164-5 0 5758
2 20670 82.5440 71.7864 0014728 214.8751 145.1448 13.84178755161726
FY-1/2
1 20788U 90 81 A 93252.08446190 -.00000035 00000-0 -11703-4 0 6269
2 20788 98.8547 275.9425 0016776 76.4064 283.8969 14.01292291154338
MET-2/20
1 20826U 90 86 A 93250.40374893 .00000019 00000-0 11620-4 0 5796
2 20826 82.5240 10.9651 0013864 114.8917 245.3686 13.83556587148655
MET-3/4
1 21232U 91 30 A 93250.74892324 .00000043 00000-0 99999-4 0 3991
2 21232 82.5444 9.2674 0013524 166.2305 193.9207 13.16453983114195
NOAA-12
```

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1 21263U 91 32 A 93253.07862788 .00000139 00000-0 70715-4 0 6632
2 21263 98.6511 281.6136 0012857 333.3910 26.6591 14.22308304120715
MET-3/5
1 21655U 91 56 A 93252.61433586 .00000043 00000-0 99999-4 0 4561
2 21655 82.5522 314.8855 0012653 174.5167 185.6096 13.16823432 99531
MIR
1 16609U 86 17 A 93252.47687747 .00000554 00000-0 99999-5 0 2903
2 16609 51.6201 156.0540 0004730 72.6014 287.4782 15.59620308432280
HUBBLE
1 20580U 90 37 B 93252.79854265 .00000491 00000-0 39066-4 0 1760
2 20580 28.4707 238.9236 0004592 210.9980 149.0331 14.92821489184177
GRO
1 21225U 91 27 B 93251.77629519 .00004337 00000-0 25340-4 0 9857
2 21225 28.4611 46.3605 0007171 178.5008 181.5672 15.76061775 13307
UARS
1 21701U 91 63 B 93247.37464806 -.00000772 00000-0 -57565-4 0 2558
2 21701 56.9828 224.1299 0003966 86.4471 273.7082 14.96117854108154
/EX
```

163. RFC: Re: Daily Solar Geophysical Data Broadcast for 07 September

Newsgroup: rec.radio.amateur.space
Date: 1993-09-10 21:14:43 UTC
From: mark@ve6mgs.ampr.org
Message-ID: <1993Sep10.211443.21319@ve6mgs.ampr.org>
Source record: 28771
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.misc

Cc: oler@rho.uleth.CA rra-wg@amdahl.com

oler@rho.uleth.CA (Cary Oler) writes:

>!!BEGIN!! (1.0) S.T.D. Solar Geophysical Data Broadcast for DAY 250, 09/07/93

These bulletins are no different than the (PKT) Geophysical Report bulletins
posted to rec.radio.info at the moment (The Packet ones add what some would
call superfluous packet headers). I would like to request comments from
interested individuals as to what to do with these bulletins in our
new rec.radio.amateur.* heirarchy.

I propose to cross-post the bulletins already posted to rec.radio.info
with the (PKT) Geophysical reports subject line (These are the shortened
information bulletins, the more verbose versions will remain in
rec.radio.info) to the rec.radio.amateur.space newsgroup. And, to request that
the current solar reports posted to rec.radio.amateur.misc cease.

However, I forsee the following areas where there may be resistance to
my proposal:
1) rec.radio.amateur.space participants are *not* interested in
hosting these reports, as it may drown out the discussion
environment that seems to be forming within that group.
2) rec.radio.amateur.misc participants, which include many of the
listserver participants, may wish to keep on viewing these
reports.

To #1, I currently cross-post several other bulletins to
rec.radio.amateur.space, and have only received ONE complaint so far. I
suspect that the fact the bulletins are cross-posted reduces the number of
actually viewed bulletins in that group (through the news-reading softwares
handling of cross-posted news) and my guess is perhaps that the solar
reports will not have a major impact and can be filtered effectively
by the tools outlined in the rec.radio.info FAQs as well if desired.

To #2, the proposal could be modified to include cross-posting to
rec.radio.amateur.misc, keeping the bulletins there, and garnering the
benefits of reducing new bandwidth by utilizing the cross-posting
mechanism.

Status Quo, I feel, is unacceptable, as I will begin making efforts to
switch over to cross-posting the bulletins to at least rec.radio.amateur.misc
and asking Cary to cease sending the bulletins to info-hams@ucsd.edu as
a minimum.

Now, what to do with the solar reports in rec.radio.shortwave ... :-)
<as he feels the power surging under his fingertips and the accompanying>
<rush of corruption! :-) >

Ciao, 73 de VE6MGS/Mark -sk-

164. Two-Line Orbital Element Sets (TLE256)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-11 03:41:51 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.747718911@afit.af.mil>
Source record: 28780
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #256 -
Alouette 1
1 00424U 62 49 A 93252.89552681 .00000039 00000-0 41476-4 0 7341
2 00424 80.4632 201.5308 0023607 113.3074 247.0558 13.67780200544087
ATS 3
1 03029U 67111 A 93251.35621365 -.00000080 00000-0 99999-4 0 9742
2 03029 14.4530 10.3230 0011852 253.9882 105.9329 1.00273065 94619
Cosmos 398
1 04966U 71 16 A 93252.84979495 .00052305 29755-4 14806-3 0 4316
2 04966 51.4834 299.3632 1297423 292.0236 54.8003 13.24503489734719
Starlette
1 07646U 75010 A 93250.23691134 -.00000055 00000-0 38357-5 0 5318
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2 21576 98.4661 326.5371 0004897 55.1941 304.9706 14.36232411112748
TUBSAT
1 21577U 91 50 D 93251.12208984 .00000038 00000-0 20200-4 0 2780
2 21577 98.4665 325.3902 0007493 54.6609 305.5279 14.36392042112547
SARA
1 21578U 91 50 E 93252.19425068 .00000282 00000-0 10587-3 0 4478
2 21578 98.4734 328.4323 0006154 57.5466 302.6317 14.38513633112805
TDRS 4
1 21639U 91 54 B 93251.59170821 .00000108 00000-0 00000+0 0 4345
2 21639 0.0357 95.9904 0002026 85.2165 205.0811 1.00271157 5760
Meteor 3-5
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1 21655U 91 56 A 93252.61433586 .00000043 00000-0 99999-4 0 4561
2 21655 82.5522 314.8855 0012653 174.5167 185.6096 13.16823432 99531
UARS
1 21701U 91 63 B 93247.37464806 -.00000772 00000-0 -57565-4 0 2558
2 21701 56.9828 224.1299 0003966 86.4471 273.7082 14.96117854108154
DMSP B5D2-6
1 21798U 91 82 A 93252.40572174 .00000003 00000-0 11829-4 0 6780
2 21798 98.9583 252.6651 0012145 210.0929 149.9516 14.13709756 91945
Glonass 53
1 21853U 92 5 A 93242.18542679 .00000015 00000-0 99999-4 0 6528
2 21853 64.8393 118.9088 0006472 202.1198 157.9389 2.13102263 12343
Glonass 54
1 21854U 92 5 B 93252.80210364 .00000015 00000-0 00000+0 0 6645
2 21854 64.8451 118.5350 0016586 17.6908 342.4547 2.13103053 12561
Glonass 55
1 21855U 92 5 C 93252.39280549 .00000015 00000-0 00000+0 0 6563
2 21855 64.8409 118.5564 0006914 197.1770 162.8875 2.13102280 12544
JERS-1
1 21867U 92 7 A 93252.19495288 .00000228 00000-0 21300-4 0 9575
2 21867 97.6682 327.1123 0000731 68.0751 292.0964 14.98665280 86297
GPS BII-12
1 21890U 92 9 A 93248.57845621 -.00000007 00000-0 99999-4 0 2927
2 21890 54.3120 268.4542 0058609 157.7057 202.5882 2.00566274 11278
GPS BII-13
1 21930U 92 19 A 93249.28746846 -.00000025 00000-0 99999-4 0 2662
2 21930 55.4708 29.2056 0062497 164.0068 196.2012 2.00563043 10211
EUVE
1 21987U 92 31 A 93244.27957931 .00001505 00000-0 68034-4 0 882
2 21987 28.4322 191.0737 0010258 61.4115 298.7511 15.17539591 68454
SAMPEX
1 22012U 92 38 A 93250.06170524 .00001011 00000-0 87168-4 0 2296
2 22012 81.6708 109.1625 0117829 242.1549 116.7696 14.91532940 64114
GPS BII-14
1 22014U 92 39 A 93247.33341257 .00000012 00000-0 99999-4 0 1708
2 22014 54.9382 209.1341 0084358 290.3031 68.7623 2.00576389 2013
Glonass 56
1 22056U 92 47 A 93252.29371678 -.00000022 00000-0 00000+0 0 4800
2 22056 64.9186 358.6363 0004817 258.0848 101.8835 2.13103102 8625
Glonass 57
1 22057U 92 47 B 93251.47234901 -.00000022 00000-0 00000+0 0 4975
2 22057 64.9271 358.6649 0004494 264.3833 95.5957 2.13103082 8602
Glonass 58
1 22058U 92 47 C 93252.58685137 -.00000022 00000-0 00000+0 0 4970
2 22058 64.9303 358.6532 0011579 292.4237 67.4878 2.13103058 8661
TOPEX
1 22076U 92 52 A 93252.82497457 -.00000002 00000-0 99999-4 0 2964
2 22076 66.0407 153.3422 0008073 263.9838 96.0231 12.80930063 50580
KITSAT-A
1 22077U 92 52 B 93249.13704215 .00000000 00000-0 99999-4 0 1144
2 22077 66.0790 154.7002 0000483 354.1910 5.9105 12.86279206 50250
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S80/T
1 22078U 92 52 C 93247.18609064 .00000000 00000-0 99999-4 0 1076
2 22078 66.0759 158.3668 0001379 59.6390 300.4765 12.86560536 50061
TOPEX R/B
1 22079U 92 52 D 93251.06625623 -.00000002 00000-0 99999-4 0 1295
2 22079 66.0610 162.8716 0072279 320.6747 38.9023 12.77665589 50307
GPS BII-15
1 22108U 92 58 A 93251.78199244 -.00000007 00000-0 99999-4 0 1899
2 22108 54.5193 268.9844 0103953 131.1473 229.7907 2.00566586 7285
FREJA
1 22161U 92 64 A 93251.54620392 .00000115 00000-0 10130-3 0 1520
2 22161 62.9988 285.0012 0772697 290.1867 61.7701 13.21664696 44571
LAGEOS II
1 22195U 92 70 B 93251.39980335 -.00000004 00000-0 99999-4 0 745
2 22195 52.6712 271.7976 0137901 354.7030 5.2074 6.47293487 20703
GPS BII-16
1 22231U 92 79 A 93251.96768193 .00000011 00000-0 99999-4 0 1247
2 22231 54.6616 210.1558 0042721 295.8563 63.6711 2.00569332 5869
GPS BII-17
1 22275U 92 89 A 93246.62256778 .00000012 00000-0 99999-4 0 1043
2 22275 54.7019 207.9749 0055913 257.3393 101.9641 2.00554981 5167
TDRS 5
1 22314U 93 3 B 93244.77238852 .00000037 00000-0 99999-4 0 924
2 22314 0.4656 71.4227 0000220 324.7398 91.8528 1.00556121 2431
GPS BII-18
1 22446U 93 7 A 93247.19375271 -.00000030 00000-0 99999-4 0 1071
2 22446 54.8052 328.9844 0065760 335.5895 24.1559 2.00558030 4209
Glonass 59
1 22512U 93 10 A 93252.50945937 .00000015 00000-0 12645-3 0 2369
2 22512 64.8654 118.3936 0008508 190.4228 169.6444 2.13102185 4141
Glonass 60
1 22513U 93 10 B 93252.45038965 .00000015 00000-0 00000+0 0 2265
2 22513 64.8502 118.4186 0006183 189.4701 170.6049 2.13102844 4340
Glonass 61
1 22514U 93 10 C 93252.68536117 .00000015 00000-0 00000+0 0 2173
2 22514 64.8662 118.3890 0013652 187.8697 172.1303 2.13101695 4347
ASTRO-D
1 22521U 93 11 A 93246.58989866 .00001773 00000-0 15159-3 0 453
2 22521 31.1033 75.1252 0077548 173.8969 186.2808 14.92559001 29236
UHF F1
1 22563U 93 15 A 93252.26240666 .00000032 00000-0 99999-4 0 398
2 22563 27.1347 303.8439 0007897 253.1406 106.8970 0.99250404 00
GPS BII-19
1 22581U 93 17 A 93249.33578500 -.00000025 00000-0 99999-4 0 332
2 22581 54.9784 29.0844 0041039 36.1125 324.1685 2.00557468 3266
ProgressM17
1 22588U 93 19 A 93252.49246072 .00010968 00000-0 11152-3 0 1508
2 22588 51.6204 154.6495 0005229 85.2670 274.8902 15.65734204 25348
ARSENE
1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
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2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
GPS BII-20
1 22657U 93 32 A 93249.96693041 -.00000025 00000-0 99999-4 0 374
2 22657 55.0154 28.8399 0059505 198.4475 161.3477 2.00576247 5945
GPS BII-21
1 22700U 93 42 A 93248.44082497 -.00000007 00000-0 99999-4 0 294
2 22700 54.7034 269.8016 0024452 296.5643 63.2262 2.00568632 1374
Soyuz TM-17
1 22704U 93 43 A 93252.79727763 .00003325 00000-0 44044-4 0 537
2 22704 51.6178 154.4418 0004719 66.0217 294.1984 15.59628853432339
NOAA 13
1 22739U 93251.60405867 .00000098 00000-0 64984-4 0 206
2 22739 98.9110 192.6188 0009673 190.6291 169.4841 14.10852146 4257
1993 051B
1 22742U 93 51 B 93252.25438875 .00430315 10370-4 68341-3 0 502
2 22742 62.8203 21.1526 0176658 119.8438 242.2472 15.80569168 4639
1993 051C
1 22743U 93 51 C 93246.87497688 .25268927 44403-4 13713-3 0 750
2 22743 62.8417 38.8799 0029187 120.7448 240.6731 16.52875460 3836
ProgressM19
1 22745U 93 52 A 93252.79727768 .00002359 00000-0 32176-4 0 266
2 22745 51.6181 154.4425 0004594 71.6030 288.6161 15.59626669 4672
RESURS F-19
1 22777U 93 53 A 93253.15085039 .00082033 00000-0 56066-4 0 419
2 22777 82.5865 142.1979 0004300 256.0056 104.0513 16.16417070 2701
GPS BII-22
1 22779U 93 54 A 93252.07022010 -.00000029 00000-0 99999-4 0 106
2 22779 54.9157 328.6920 0062219 192.7808 167.1180 2.01761598 200
1993 054B
1 22780U 93 54 B 93253.05839850 .00002830 00000-0 14852-3 0 65
2 22780 22.0462 249.0072 0193863 311.4904 46.9043 14.93692499 1578
1993 054C
1 22781U 93 54 C 93252.48796014 .00059191 13659-4 16557-2 0 216
2 22781 34.8390 315.2855 6041445 202.8946 111.5083 4.05895140 424
Meteor 2-21
1 22782U 93 55 A 93251.57440290 .00000001 00000-0 -43893-5 0 113
2 22782 82.5455 69.6015 0021356 297.2444 62.6534 13.82985120 1161
TEMISAT
1 22783U 93 55 B 93252.44177645 .00000113 00000-0 97591-4 0 152
2 22783 82.5459 68.9116 0020938 294.4885 65.4094 13.83097099 1288
1993 055C
1 22784U 93 55 C 93252.51411896 -.00000054 00000-0 -54527-4 0 125
2 22784 82.5471 68.8530 0020996 294.3301 65.5664 13.83096186 1299
1993 056A
1 22787U 93 56 A 93252.38847030 .00000088 00000-0 99999-4 0 102
2 22787 26.6435 328.3214 7309514 180.5490 177.8626 2.22160603 13
1993 056B
1 22788U 93 56 B 93252.83902990 .00031706 00000-0 12449-2 0 104
2 22788 27.0489 325.0915 5268420 186.1888 162.7169 5.26837968 333
1993 057A
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1 22789U 93 57 A 93252.47922211 .00230893 10415-4 22688-3 0 92
2 22789 64.8918 216.6732 0087407 61.8556 299.1252 16.03348549 317
1993 057B
1 22790U 93 57 B 93253.20393379 .04116286 36146-4 53266-3 0 169
2 22790 64.9010 213.8531 0050156 66.1070 294.7741 16.30901034 430
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

165. Sat tracking for the Mac or HP-48???

Newsgroup: rec.radio.amateur.space
Date: 1993-09-11 05:53:59 UTC
From: bwehr@iastate.edu
Message-ID: <CD6Dpz.A2x@news.iastate.edu>
Source record: 28770

Does anyone know where I could get a simple sat. tracking program for the Mac
or the HP-48? Preferably something off a FTP site. I am on broke row (typical HAM) and need some sensible advice.

Please E-Mail.

Brant Wehr N0UTT
bwehr@iastate.edu

166. GIF of Joe Kittinger's jump at 100,000 feet?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-11 22:42:23 UTC
From: btbg1194@uxa.cso.uiuc.edu
Message-ID: <26tk8f$860@vixen.cso.uiuc.edu>
Source record: 28772
Cross-posted to: rec.radio.amateur.space,sci.space.shuttle

Is there a GIF easily available somewhere with the photograph of
Capt Joe Kittinger's parachute jump from a balloon at 100,000 feet?

He was testing a survival/escape suit for astronauts to use during
launch in 1960. The view is through the door of the balloon pod (?)
of his back as he is falling about 10 feet below the balloon.
Way down below, you can see the cloud ceiling (?). It is an awesome
view of a man against the elements.

Thanks for any leads.

--
Brad Banko; Univ of Illinois; b-banko@uiuc.edu
====== Ich habe kein Bock mehr zu schreiben. ======================
See one. Do one. Teach one. 73 de kb8cne @ n9lnq.il

167. ANS-254 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-12 03:46:09 UTC
From: cowdin@pogo.DEn.mmc.COM
Message-ID: <$ans-254.01@ampr.org>
Source record: 28783
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-254.01
SPACE SYMPOSIUM AGENDA

HR AMSAT NEWS SERVICE BULLETIN 254.01 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-254.01

W5IU Provides Agenda For AMSAT-NA Space Symposium 7-10 OCT

PRELIMINARY AGENDA
1993 AMSAT-NA ANNUAL MEETING
AND SPACE SYMPOSIUM

October 7, 8, 9, & 10, 1993
La Quinta Inn - Arlington, Texas

Thursday, October 7th

All Day - Leave La Quinta Inn at 09:00
Electronic Surplus Tour of the Fort Worth/Dallas Metroplex
- Transportation & Tour Guide Provided

Friday, October 8th, Morning -

Registration Opens -
Antenna Test Range Adjacent To Hotel - WA5VJB, Kent Britain

Friday, October 8th, Afternoon -

ARRL/AMSAT Educational Workshop - WA1STO, Rosalie White
(Runs Concurrent with technical papers)

Technical Papers:

"Status of SEDSAT-1" - KD4ETA, Dennis Wingo
"UNAMSAT-1 Experimental Module - TSFR" - XE1TU, David Liberman
"IT-AMSAT-1 Status" - I2KBD, Alberto Zagni
"High-Resolution Weather Satellites" - N5ITU, Jeff Wallach
"Hubble Space Telescope Service Mission Preview" - N8FGV, Dan
Schultz

Friday, October 8th, Evening - on your own for dinner and entertainment.
Local assistance provided.

Saturday, October 9th, Morning -

"Welcome To The 1993 Space Symposium and AMSAT-NA Annual Meeting"
W3XO, Bill Tynan - AMSAT-NA President

"The AMSAT Phase 3D Spacecraft"
WD4FAB, Dick Jansson - AMSAT-NA VP of Engineering

"The AMSAT Phase 3D Electronics"
DB2OS, Peter Guelzow - AMSAT-DL

"AMSAT Phase 3D Antenna Design Review" - WA4NFY, Stan Wood

"How GPS Receivers Work"
"AMSAT Phase 3D GPS and Master Oscillator Package"
W3IWI, Tom Clark - AMSAT-NA President Emeritus

"The Shuttle Amateur Radio Experiment - Current Status and Future Visions"
KA3HDO, Frank Bauer - AMSAT-NA VP, Manned Space
"SAREX Shuttle Mission Operations - From A Payload's Point Of View"
W5DID, Lou McFadin

Saturday, October 9th, Afternoon -

"Managing OSCAR-13"
G3RUH, James Miller

"Development Of A Portable Mode S Ground Station"
KA9LNV, Ed Krome

"DOVE Progress Report and Future Operation" - WD0E, Jim White

"Some 20-20 Hindsight: A Slightly Different View Of WEBERSAT"
KB7KCL, Bob Argyle

"DSP-93: The Joint DSP Program (TAPR/AMSAT)"
N5BRG, Bob Stricklin

"Digital Processing Of Weak Signals Buried In Noise"
AA7FV, Darrel Emerson

"AMSAT-NA Operations Report - 1993"
W5IU, Keith Pugh - AMSAT-NA VP of Operations

Meet Your AMSAT-NA Board of Directors

Saturday, October 9th, Evening -

Happy Hour

Dinner Banquet, Program, Recognition Awards and
Prize Drawings

Sunday, October 10th, Morning -

Field Operations Breakfast

AMSAT-NA Board of Directors Meeting
(Open Meeting, Run Concurrent with Technical Papers)

Technical Papers -

"VOXSAT - VOice eXperiment SATellite"
LW2DTZ, Gustavo Carpignano - AMSAT-LU VP

"Tools For The Digital Satellites - Part 1, The Downlink"
WA4SXM, Gould Smith

"Implementing The PACSAT Broadcast Protocol On
Terrestrial Networks" - WA0PTV, John Hansen

"Non-Messaging Uses Of The Store-and-Forward Satellites -
The Integrated Power Corporation Nusa Penida Project"
WD3Q, Eric Rosenberg

"S Band For The Beginner" - KA9LNV, Ed Krome

"Using Metal Booms To Support AMSAT Antennas"
WA5VJB, Kent Britain

"Microsat Ground Stations" - WB1HBU, Eric Cottrell

"Birth Of A Satellite Education Program In Sweden"
SM2UHI, Borje Rautio
"Experimental Determination Of Properties Of The
RS-10 Mode A Transponder" - KE3HP, Walter Daniel

Sunday, October 10th, Noon - End of Symposium - Board Meeting Continues

[The AMSAT News Service (ANS) would like to thank Keith Pugh (W5IU) for this bulletin item. There is still time to register for the AMSAT-NA Symposium. For more information about the Symposium, contact AMSAT-NA Headquarters at (301) 589-6062.]

/EX
SB SAT @ AMSAT $ANS-254.02
AO-13 ZRO TESTS RETURN!

HR AMSAT NEWS SERVICE BULLETIN 254.02 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-254.02

ZRO Tests Return To AO-13

The ZRO Memorial Technical Achievement Award Program, or just "ZRO Test" has a new schedule for September and October '93 via AMSAT-OSCAR-13. This activity is a test of operating skill and equipment performance. Due to scheduling difficulties only three tests have been set up for this round so be sure to mark the test dates and times on your calendar.

During a typical ZRO run, a control station will send numeric code groups using CW at 10 words-per-minute. At the beginning of the run, uplink power from the control station is set to match the general beacon downlink strength. This is level "zero." The control operator will send and repeat a random five-digit number, then lower his uplink power by 3 dB (half power)

and repeat the procedure with a new random number. This will continue to a level 30 dB below the beacon (level "A").

A participating listener monitors the downlink signals until he can no longer copy the numbers. Those who can hear the beacon will qualify for the basic award by copying the code group heard at level "zero". The challenge is to improve home-station performance to a point where the lower-level downlink signals can be copied (levels 6 through 9).

The following schedule of Mode "B" tests were chosen for convenient operating times and favorable squint angles. The tests can be heard on 145.840 MHz. Andy (WA5ZIB) will conduct all the tests. Mode "JL" tests will no longer occur due to the failure of AO-13's 70-cm transmitter. Ed (N5EM) will be back next year after he completes station calibrations necessary to insure accurate Mode "B" activity. His "JL" tests were greatly appreciated.

Sunday Sep. 26, 1993 at 0545 UTC
Saturday Oct. 2, 1993 at 1335 UTC
Monday Oct. 18, 1993 at 0430 UTC

Note that the dates and days are shown in "UTC", thus the first and third tests shown occur in the late evening hours for those in North America. For example, the October 18th UTC test is at 11:30 PM CDT Sunday night (the 17th). Any changes will be announced as soon as possible via the AMSAT HF and AO-13 Operations Nets.

ZRO brochures are available from WA5ZIB, Andy MacAllister, AMSAT VP of User Operations, 14714 Knightsway Drive, Houston, TX 77083 for an S.A.S.E. with two units of postage. The brochure characterizes test procedures, means for obtaining certificates and gives some historical background about the program. New brochures were not made for the current round of tests, but this announcement and a graphical presentation of the satellite's view during the tests will be provided along with the March 1993 version of the brochure.

All listener reports with date of test and numbers copied should be sent to WA5ZIB at the address above. A report will be returned verifying the level of accurate reception.

/EX
SB SAT @ AMSAT $ANS-254.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 254.03 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-254.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the

start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

18-Sep-93 1515 B 96 N7NQM W5IU
2-Oct-93 1400 B 160 WA5ZIB WJ9F
9-Oct-93 1500 B 101 W9ODI N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

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Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-254.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 254.04 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-254.04

Weekly OSCAR Status Reports: 11-SEP-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 16-Oct 25
Mode-B : MA 0 to MA 60 !
Mode-BS : MA 60 to MA 120 !<- after Aug 30 (hopefully)
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Alon/Alat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, 25-Oct-93
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-16: Operating normally. SATGATE operations have moved from LO-19 (LUSAT) to AO-16 (PACSAT). As KI6QE indicated when the move was made, the number of files involved is quite small, so it is still possible to keep track of everything on this satellite even with checking a few times a week. [WH6I]

UO-22: Operating normally. There were a few good images last week. [WH6I]

KO-23: Operating normally. [WH6I]

FO-20: N0NBH reports that FO-20 continues to operate normally after last week's on-board computer resets. [N0NBH]

UNAMSAT-1: The Mexican MICROSAT is scheduled for launch late this year on a refurbished Soviet ICBM designed to carry satellites. So far Program Manager XE1TU does not have all the final keplerian elements of the intended orbit. However, the known parameters are as follows:
Orbital Inclination = 73 degrees
Altitude = 730 KM
Orbital Eccentricity = 0.00000000
The satellite will separate from the rocket with no spin. All transmitters will be silent at separation and for a period of at least 1 hour. The VHF receive antenna and the two halves of the canted dipole for 40.997 MHz will be collapsed and then they will be deployed 3 minutes after separation. [XE1TU]

RS-10: HB9RHV is quite active on RS-10 and looks forward to contacts and schedules for those who would like to make a DX contact. [HB9RHV]

UO-11: Controllers at the UoSAT Control Centre at the University of Surrey are requesting the help of the amateur radio community around the world in collecting information and data from UOSAT-OSCAR-11. The Forth Diary Operating system aboard UO-11 has crashed within the past 24 hours. This has rendered the spacecraft in a non-nominal operating state. The collection of information and data related to the operational condition of the spacecraft over the next several days will be essential in helping the controllers to understand the spacecraft's current condition. Therefore the UoSAT command team is asking radio amateurs around the world to monitor the spacecraft and relay any reception reports and or telemetry data collected from the spacecraft to them via G0SYX @ UO-22, G0SYX @ KO-23 or via the INTERNET address: D.Loughmiller@ee.surrey.ac.uk UOSAT-OSCAR-11 operates on a 2M frequency of 145.825 MHz and on a 70 cm frequency of 435.027 Mhz. Controllers are most interested in which beacon is active at the time of any given observation and whether the signal contains data or not. Any telemetry data collected would be of particular interest to the controllers as well. Any observations provided by the amateur community will be most appreciated. UoSAT controllers will issue subsequent bulletins about the status of the UoSAT-OSCAR-11 spacecraft as the situation develops. [KO5I/G0SYX]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.
/EX

168. Re: InstantTrack on QRZ Cdrom?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-12 13:32:35 UTC
From: eac@world.std.com
Message-ID: <CD8tMC.MJt@world.std.com>
Source record: 28773

In <1993Sep10.022125.18292@n8emr.cmhnet.org> gws@n8emr.cmhnet.org (Gary Sanders) writes:

>it was shareware. I picked up the QRZ cdrom and found
>it in the misc/dl_files directory as it_track.exe

I picked up the March 1993 edition of QRZ and it_track.exe was not on it.
I assume there is a newer edition out?

.73 Eric eac@world.std.com

169. Need Info about Beacons.

Newsgroup: rec.radio.amateur.space
Date: 1993-09-12 15:44:23 UTC
From: bwehr@iastate.edu
Message-ID: <CD8zpz.E1n@news.iastate.edu>
Source record: 28774

Brant Wehr N0UTT
bwehr@iastate.edu

170. need info about beacons

Newsgroup: rec.radio.amateur.space
Date: 1993-09-12 20:58:43 UTC
From: bwehr@iastate.edu
Message-ID: <CD9E9v.KCJ@news.iastate.edu>
Source record: 28775

My last posting got messed up. What I need is a list of freqs and beacons for some of the sats. I have looked for this info and come up with nothing. If anyone could help please E-Mail.
BTW Orbitrack works great and well enough for me.

Brant Wehr
bwehr@iastate.edu

171. Re: InstantTrack on QRZ Cdrom?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-13 00:10:18 UTC
From: antonio@qualcomm.com
Message-ID: <1993Sep13.001018.20818@qualcomm.com>
Source record: 28777

In article <1993Sep10.022125.18292@n8emr.cmhnet.org> gws@n8emr.cmhnet.org (Gary Sanders) writes:
> Is the InstantTrack V1.0 software by Franklin Antonio
> now a free distributable software package? I thought
> it was shareware. I picked up the QRZ cdrom and found
> it in the misc/dl_files directory as it_track.exe

InstantTrack is neither shareware nor freely distributable. It can be purchased from AMSAT.

Inclusion of InstantTrack in this cdrom is in violation of my copyright. On July 5th, I demanded that the manufacturer cease all sales of QRZ containing InstantTrack, advise his distributors to do same, etc. Unfortunately, this does not seem to have caused sales to stop.

If any of you have purchased a copy of QRZ which contains InstantTrack, I would sure appreciate it if you would send me a brief letter documenting same. This may be helpful in possible litigation.

My address is: Franklin Antonio, 2765 Cordoba Cove, Del Mar, CA 92014. If this is too much trouble, you can send email, although a written letter is a little better when dealing with lawyers. My email address is: antonio@qualcomm.com .

Include the following information in your letter:

1. Your name and address.

2. Where, when you purchased QRZ. If you purchased it in a store, then name and address of the store would be helpful. If you don't know the address, name of store and city is ok.

3. Statement that your copy of QRZ CD-ROM does contain InstantTrack. (Look in misc/dl_files/it_track.exe, tho it might be elsewhere in different versions of the CD-ROM.)

4. Version #, or date appearing on face of QRZ CD-ROM. (or just xerox the front of the CD-ROM for identification.)

Sorry to bother you with all of this. It's sad that the world works this way. Now put this out of your mind, and go do something positive this afternoon!

172. Re: GIF of Joe Kittinger's jump at 100,000 feet?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-13 00:23:25 UTC
From: mark@cms-stl.com
Message-ID: <MARK.93Sep12182325@swan.cms-stl.com>
Source record: 28776
Cross-posted to: rec.radio.amateur.space,sci.space.shuttle

In article <26tk8f$860@vixen.cso.uiuc.edu> btbg1194@uxa.cso.uiuc.edu (Bradley T Banko) writes:

> Is there a GIF easily available somewhere with the photograph of
> Capt Joe Kittinger's parachute jump from a balloon at 100,000 feet?
>
> He was testing a survival/escape suit for astronauts to use during
> launch in 1960. The view is through the door of the balloon pod (?)
> of his back as he is falling about 10 feet below the balloon.
> Way down below, you can see the cloud ceiling (?). It is an awesome
> view of a man against the elements.
>
> Thanks for any leads.

I would also be interested in this info.

TIA,
Mark Cain

173. Quadrifilar Heliz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-13 02:24:41 UTC
From: psmith@convex.com
Message-ID: <1993Sep13.022441.4648@news.eng.convex.com>
Source record: 28786

Does anyone know where I could find plans/dimensions, etc. for building a Qaudrifilar Helix for 145 MHz and 435 MHz? If you know of a book or other source of formulas, etc. I'd be more appreciative if you'd tell me which one...

Thanks and 73 Presley N5VGC psmith@convex.com

174. Re: need info about beacons (here's my list)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-13 13:53:46 UTC
From: lkollar@nyx.cs.du.edu
Message-ID: <1993Sep13.135346.8249@mnemosyne.cs.du.edu>
Source record: 28778

bwehr@iastate.edu (Brant D Wehr) writes:

>What I need is a list of freqs and beacons for
>some of the sats.

Here's something I've put together over time. The original list came from
VE3UIL; I've edited it down to include the current operations of each sat
(as I understand them to be). It only includes amateur satellites.

Hope it helps!

---- cut here ----

AMSAT-OSCAR 10

General Beacon 145.809 MHz (Unmodulated carrier)
Engineering Beacon 145.987 MHz (Switched off)
Mode B Uplink 435.030 - 435.180 MHz (SSB,CW)
Mode B Downlink 145.825 - 145.975 MHz (SSB,CW,inverting)

UoSAT-OSCAR 11

Beacon 145.826 MHz (AFSK/FM)
Beacon 435.025 MHz (AFSK/FM)
Beacon 2401.50 MHz (AFSK/FM)

Radio Sputnik 10

Beacon/ROBOT 29.357 MHz (CW)
Beacon/ROBOT 29.403 MHz (CW)
Mode A Uplink 145.860 - 145.900 MHz (SSB,CW)
Mode A Downlink 29.360 - 29.400 MHz (SSB,CW)
ROBOT A Uplink 145.820 MHz (CW)
ROBOT A Downlink 29.357 or 29.403 MHz (CW)

AMSAT-OSCAR 13

General Beacon 145.812 MHz (PSK,CW,RTTY)
Engineering Beacon 145.985 MHz (PSK,CW,RTTY)
Mode B Uplink 435.423 - 435.573 MHz (SSB,CW)
Mode B Downlink 145.825 - 145.975 MHz (SS,CW,inverting)

Beacon 2400.325 MHz (PSK,RTTY)
Beacon 2400.664 MHz (PSK,RTTY)
Mode S Uplink 435.603 - 435.639 MHz (SSB,CW,FM)
Mode S Downlink 2400.711 - 2400.747 MHz (SSB,CW,FM)

UoSAT-OSCAR 14

Uplink 145.975 MHz (FSK/FM)
Downlink 1 435.070 MHz (FSK/FM)
Downlink 2 435.070 MHz (AFSK/FM)

AMSAT-OSCAR 16

Uplinks 145.900, 145.920, 145.940, 145.960 MHz (AFSK/FM)
Downlink (RC) 437.05130 MHz (BPSK/SSB)
Downlink S 2401.1428 MHz (BPSK/SSB)

DOVE-OSCAR 17

Beacon 1 145.82516 MHz (AFSK/FM,Dig voice/FM)
Beacon 2 145.82438 MHz (AFSK/FM,Dig voice/FM)
Beacon S 2401.2205 MHz (BPSK/SSB)

WEBERSAT-OSCAR 18

Downlink (PSK) 437.0751 MHz (BPSK/SSB)
Downlink (RC) 437.1020 MHz (BPSK/SSB)
Uplink ATV (NTSC) 1265.000 MHz (TV/AM)

LUSAT-OSCAR 19

Uplinks 145.840, 145.860, 145.880, 145.900 MHz (AFSK/FM)
Downlink (PSK) 437.15355 MHz (BPSK/SSB)
Downlink (RC) 437.12580 MHz (BPSK/SSB)
CW Beacon 437.125 MHz (CW)

FUJI-OSCAR 20

Beacon 435.795 MHz (CW)
Mode JA Uplink 145.900 - 146.000 MHz (SSB,CW)
Mode JA Downlink 435.800 - 435.900 MHz (SSB,CW,inverting)

Mode JD Uplinks 145.850, 145.870, 145.890, 145.910 MHz (AFSK/FM)
Mode JD Downlink 435.910 MHz (BPSK/SSB)

AMSAT-OSCAR 21

Beacon 145.822 MHz (CW)
Beacon 145.952 MHz (BPSK/FM)
Beacon 145.983 MHz (BPSK/SSB)
RUDAK 2 Uplink 1 435.016 MHz (AFSK/FM)
RUDAK 2 Downlink 145.983 MHz (Various modes)

Beacon 145.948 MHz (CW)
Beacon 145.838 MHz (BPSK/FM)
Beacon 145.800 MHz (BPSK/FM)

Radio Sputnik 12

Beacon/ROBOT 29.408 MHz (CW)
Beacon/ROBOT 29.454 MHz (CW)
Mode A Uplink 145.910 - 145.950 MHz (SSB,CW)
Mode A Downlink 29.410 - 29.450 MHz (SSB,CW)

ROBOT A Uplink 145.831 MHz (CW)
ROBOT A Downlink 29.408 or 29.454 MHz (CW)

Beacon/ROBOT 29.408 MHz (CW)
Beacon/ROBOT 29.454 MHz (CW)
Mode K Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode K Downlink 29.410 - 29.450 MHz (SSB,CW)
ROBOT K Uplink 21.129 MHz (CW)
ROBOT K Downlink 29.408 or 29.454 MHz (CW)

Beacon/ROBOT 145.912 MHz (CW)
Beacon/ROBOT 145.959 MHz (CW)
Mode T Uplink 21.210 - 21.250 MHz (SSB,CW)
Mode T Downlink 145.910 - 145.950 MHz (SSB,CW)
ROBOT T Uplink 21.129 MHz (CW)
ROBOT T Downlink 145.912 or 145.959 MHz (CW)

--
Larry Kollar, KC4WZK | I like CW, but that doesn't mean I think every ham
lkollar@nyx.cs.du.edu | should have to learn it.
"You mean you came back from the dead, to tell me I'm *odd*?"

175. Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-13 18:48:59 UTC
From: davidar@microsoft.com
Message-ID: <1993Sep13.184859.23408@microsoft.com>
Source record: 28779

I haven't had any luck trying. Also, any hints on how to connect to MIR would be appreciated. I have attempted on 3 different passes, and in each pass I got "R0MIR-1 Busy".

Thank you.

davidar@microsoft.com

176. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 02:54:45 UTC
From: gerry@cs.tamu.edu
Message-ID: <273bpl$6tp@TAMUTS.TAMU.EDU>
Source record: 28785

In article <1993Sep13.184859.23408@microsoft.com>,
David Arnold <davidar@microsoft.com> wrote:
>I haven't had any luck trying. Also, any hints on how to connect to MIR
>would be appreciated. I have attempted on 3 different passes, and in each
>pass I got "R0MIR-1 Busy".

Unless Alex has reconfigured the TNC, which is a real possibility, I suspect you've just plain gotten into a collision problem. Mir has established that, in order to not lose too many connects during their brief overhead time, they have to keep the number of simultaneous connects down to a small number. Like, 1. So, it's possible to get 'em when they're busy. Basically, it's been my experience that you need to get 'em when they just hit the horizon, or be persistent throughout the pass. Get a busy disconnect, start the process over again immediately. It's not magic, just a little frustrating. But how would YOU like to be the subject of so many people's interest?

73, gerry

177. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 12:32:05 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748009925@afit.af.mil>
Source record: 28787

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

STS 51
1 22795U 93 58 A 93256.41666666 .00036897 00000-0 89862-4 0 43
2 22795 28.4621 352.7380 0026491 330.5874 12.7533 15.94075766 146

178. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 14:07:55 UTC
From: don@genroco.com
Message-ID: <1993Sep14.140755.21801@genroco.com>
Source record: 28788

In article <273bpl$6tp@TAMUTS.TAMU.EDU> gerry@cs.tamu.edu (Gerald J Creager) writes:
>In article <1993Sep13.184859.23408@microsoft.com>,
>David Arnold <davidar@microsoft.com> wrote:
>>I haven't had any luck trying. Also, any hints on how to connect to MIR
>>would be appreciated. I have attempted on 3 different passes, and in each
>>pass I got "R0MIR-1 Busy".
>
>have to keep the number of simultaneous connects down to a small number.
>Like, 1. So, it's possible to get 'em when they're busy. Basically, it's
>been my experience that you need to get 'em when they just hit the horizon, or
>be persistent throughout the pass. Get a busy disconnect, start the process
>over again immediately. It's not magic, just a little frustrating. But how
>would YOU like to be the subject of so many people's interest?
>
This is absolutely the wrong way to go about this. You are right in
that they allow one connect. But if everyone trying to contact MIR
persistently tries to connect while MIR is connected to another
station, then no one gets connected and the guy who is connected
cannot complete his QSO because of the QRM. Everyone then has to
wait until MIR times out and resets which is unlikely to happen
during that pass. All you've done is guaranteed that no one can
complete a QSO by this method.

You should monitor what MIR is doing and only after a QSO with
another station is completed should you then try to connect. If you
see MIR connect to another station, stop trying immediately until MIR
disconnects again.

Donald D. Woelz, K9GR Office Phone: 414-644-8700
GENROCO, Inc. K9GR @WB9TYT.#MKE.WI.USA.NOAM
205 Kettle Moraine Drive North k9gr@k9gr.ampr.org [44.92.1.48]
Slinger, WI 53086 U.S.A. don@genroco.com

179. Re: Quadrifilar Heliz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 15:46:55 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <274p1f$t21@pith.uoregon.edu>
Source record: 28790

In article <1993Sep13.022441.4648@news.eng.convex.com> psmith@convex.com (Presley Smith) writes:
> Does anyone know where I could find plans/dimensions, etc. for building
> a Qaudrifilar Helix for 145 MHz and 435 MHz? If you know of a book
> or other source of formulas, etc. I'd be more appreciative if you'd
> tell me which one...
>
> Thanks and 73 Presley N5VGC psmith@convex.com

I too would be interested in plans for this antenna...got an ad in the mail for one and they wanted ~$300.

--
Jeff Hite KF7SZ
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

180. Re: Quadrifilar Heliz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 15:47:10 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <274p1u$t2c@pith.uoregon.edu>
Source record: 28791

In article <1993Sep13.022441.4648@news.eng.convex.com> psmith@convex.com (Presley Smith) writes:
> Does anyone know where I could find plans/dimensions, etc. for building
> a Qaudrifilar Helix for 145 MHz and 435 MHz? If you know of a book
> or other source of formulas, etc. I'd be more appreciative if you'd
> tell me which one...
>
> Thanks and 73 Presley N5VGC psmith@convex.com

I too would be interested in plans for this antenna...got an ad in the mail for one and they wanted ~$300.

--
Jeff Hite KF7SZ
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

181. Re: Quadrifilar Heliz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 15:49:36 UTC
From: jeffh@ludwig.cc.uoregon.edu
Message-ID: <274p6g$t56@pith.uoregon.edu>
Source record: 28789

In article <1993Sep13.022441.4648@news.eng.convex.com> psmith@convex.com (Presley Smith) writes:
> Does anyone know where I could find plans/dimensions, etc. for building
> a Qaudrifilar Helix for 145 MHz and 435 MHz? If you know of a book
> or other source of formulas, etc. I'd be more appreciative if you'd
> tell me which one...
>
> Thanks and 73 Presley N5VGC psmith@convex.com

I too would be interested in plans for this antenna...seen ads for them at ~$300. Could not believe it.

--
Jeff Hite
Computing Center
U of Oregon
jeffh@ludwig.cc.uoregon.edu

182. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 16:51:21 UTC
From: dfk@col.hp.com
Message-ID: <274sq9$f4m@hp-col.col.hp.com>
Source record: 28792

Don Woelz (don@genroco.com) wrote:
: In article <273bpl$6tp@TAMUTS.TAMU.EDU> gerry@cs.tamu.edu (Gerald J Creager) writes:
: >In article <1993Sep13.184859.23408@microsoft.com>,
: >David Arnold <davidar@microsoft.com> wrote:
: >>I haven't had any luck trying. Also, any hints on how to connect to MIR
: >>would be appreciated.
: >
: >Basically, it's
: >been my experience that you need to get 'em when they just hit the horizon, or
: >be persistent throughout the pass.
: >
: This is absolutely the wrong way to go about this.

The correct method is nicely explained in the Aug 1993 issue of QST on pages
65 and 66. Continuous connect attempts when MIR is busy just brings all
data flow to a halt. The article shows how to configure the TNC to look at
the control information in a packet, and determine the best time to attempt
a connect.

Dave N0UVR
dfk@col.hp.com

183. Re: Quadrifilar Heliz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 18:28:25 UTC
From: rvt@calvin.sbc.com
Message-ID: <2752g9$7h4@sbctri.sbc.com>
Source record: 28793

In article <274p6g$t56@pith.uoregon.edu> jeffh@ludwig.cc.uoregon.edu (Jeff Hite) writes:
>In article <1993Sep13.022441.4648@news.eng.convex.com> psmith@convex.com
>(Presley Smith) writes:
>> Does anyone know where I could find plans/dimensions, etc. for building
>> a Qaudrifilar Helix for 145 MHz and 435 MHz? If you know of a book

The ARRL Satellite Experimenter's Handbook, 1980, has constuction
information for quadrifilar helix antennas for 146 and 435 MHz.
See pages 8-15 and 8-16.

--
Roger V. Thompson, P.E. |ARS AD5T
Southwestern Bell Technology Resources, Inc. |314-529-7847 (Office)
550 Maryville Centre Dr. |314-529-7674 (Fax)
St. Louis, MO 63141 |rvt@calvin.sbc.com

184. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 20:34:59 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748038899@afit.af.mil>
Source record: 28794

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

STS 51
1 22795U 93 58 A 93257.24999999 .00038189 00000-0 90490-4 0 71
2 22795 28.4628 346.4784 0026379 339.7232 116.8841 15.94583426 285
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

185. Re: InstantTrack on QRZ Cdrom?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 22:14:28 UTC
From: kd4cim@vulcan.com
Message-ID: <T7XV0B1w165w@vulcan.com>
Source record: 28798

eac@world.std.com (Eric A Cottrell) writes:

> I picked up the March 1993 edition of QRZ and it_track.exe was not on it.
> I assume there is a newer edition out?
>

Interesting, I have a March 1993 and it is most definitely on it.
There is no identifying edition number or anything else to designate
a release number or anything. Perhaps, Walnut Creek recut the March
1993 CDROM and removed the copyrighted software in response to
Franklin Antonio's very justified complaint. It is also obvious
that there are versions with IT floating around in the distribution
channels. I got the QRZ CD from one of the vendors at the
Huntsville Hamfest in August. (and apparently trashed the receipt -
if there was one - oh well.)

BTW, I have my own copy of IT from AMSAT-NA. The callbook was the
only reason to get the CD. The software on it is not very good.
The SIMTEL CDROM is a better buy to get freeware/shareware. And the
SAM database from RT-Systems probably a better way of getting the
callbook, since they issue frequent updates, it fits on about 20
meg of HD space since it is compressed and the search and list
programs are far better than those on QRZ.

de Jerry

BHM AmprNet - kd4cim@kd4cim.ampr.org [44.100.113.19]
Packet Radio - KD4CIM @ KD4CIM.AL.USA.NA
Internet - kd4cim@vulcan.com

186. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 22:18:35 UTC
From: brian@nothing.ucsd.edu
Message-ID: <275fvrINNngc@network.ucsd.edu>
Source record: 28795

On the other hand, if you get a busy disconnect, that's an established two-way contact - you sent a SABM, they replied with a DM. That's all you need to log it if you're just proving you could do it.
- Brian

187. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-14 23:20:21 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748048821@afit.af.mil>
Source record: 28796

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93257.24999999 .00038189 00000-0 90490-4 0 71
2 22795 28.4628 346.4784 0026379 339.7232 116.8841 15.94583426 285
1993 058B
1 22796U 93 58 B 93256.91478473 -.00023693 00000-0 -29821-1 0 33
2 22796 15.4628 357.0990 7477878 359.4164 359.9364 2.00283271 34
1993 058D
1 22797U 93 58 D 93256.91467598 -.00000220 00000-0 99999-4 0 14
2 22797 15.4921 356.7068 7472328 359.5954 2.6435 2.01098776 32
1993 058C
1 22798U 93 58 C 93255.84373842 .00021892 00000-0 79894-4 0 13
2 22798 28.4606 357.0089 0022166 244.8563 57.6075 15.86464053 54
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

188. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 11:00:58 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-748090852@unomaha.edu>
Source record: 28797
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.packet,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

```
Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.4 06/30/93 12:04:14
Changes: new rec.radio.amateur.* newsgroups, cs.utexas.edu gateway

(Note: The following is reprinted with the permission of the author.)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 30 June 1993 to
add the groups created during the latest reorganization vote and the
description of the cs.utexas.edu gateway.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
arrangement, but one was that the system was not supposed to be used for
commercial purposes. Since one of hams' favorite pastimes is swapping
gear, it was natural for hams to post messages about equipment for sale
to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use
restriction, and after some argument, a group was created specifically
for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to
```

a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize this, and to encourage discussion not only of other text-based digital modes,

such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, has not been removed as of this writing, but it is obsolete, and you should use .digital.misc instead. The group has the .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. The neverending no-code debate goes here, as does the New Jersey scanner law, the legality of ordering a pizza on the autopatch, what a bunch of rotten no-goodniks the local frequency coordinating body is, and so on.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas, commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle

Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

The rec.radio.amateur.misc, .packet, and .policy groups, and the rec.radio.info group, are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server. The rec.radio.swap group is not available for reading by electronic mail. At this writing, the most recently added groups are also not available for reading by electronic mail, although that may change.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
==========

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

189. InstantTrack/QRZ! Mudslinging

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 17:49:30 UTC
From: cole@soldev.tti.com
Message-ID: <cole.300.748115370@soldev.tti.com>
Source record: 28799

The mud-slinging over the inclusion of InstantTrack on the QRZ! CD-ROM really disappoints me. On one hand, if InstantTrack is really on the QRZ! CD-ROM (and I haven't bothered to check mine), that would clearly be a violation of Franklin Antonio's copyright. On the other hand, most of us observed Fred Lloyd putting together the CD-ROM and saw his appeals for non-copyrighted software. I'm sure that if InstantTrack was included it was indeed inadvertant.

But what's done is done. I'm an AMSAT Life Member. I spent LOTS of hours calculating and printing the Project Oscar orbital schedules for the amateur satellite community before the era of the PC. I bought InstantTrack as soon as it came out and I think it's probably the best satellite tracking program ever written. But I refuse to participate in a pissing contest over a simple mistake and I definitely won't support any participation by AMSAT.

Responsible, ethical people pay for the software they use. They don't steal it. Others seem to find a way to get a copy, no matter hard or easy it is to do so. I can't believe AMSAT's income stream will be affected much either way.

I believe Franklin, Fred, and the people at Walnut Creek CD-ROM are all reasonable people, and I hope they can reach a positive resolution. The rest of us should just butt out.

Randy Cole
KN6W

190. 9600 baud fsk tone pair frequencies, wat are they?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 18:44:26 UTC
From: bmm1@freenet.scri.fsu.edu
Message-ID: <199309151843.AA139365@freenet.scri.fsu.edu>
Source record: 28800
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space

Does anybody know the tone pair frequencies for 9600 baud fsk? I am going to modify a couple of radios for 9600 baud and would like to feed the pure tones through on the bench and see what works best. Also any tips about 9600 baud modifications would be greatly appreciated. And one more thing, does anyone know what frequencies are used for terrestrial 9600 baud fsk packet?
--

191. PB.EXE on a 4.77mhz XT?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 18:54:02 UTC
From: bmm1@freenet.scri.fsu.edu
Message-ID: <199309151852.AA42146@freenet.scri.fsu.edu>
Source record: 28801

I recently upgraded PB.EXE from the older version to the 4-30-92 version. The old version ran fine but the new version locks up my computer requiring a reboot. I suspect (as does Jeff Ward) that it is because I am running it on a 4.77mhz, 8088 machine. Has anyone else had failure or success running PB.EXE on an XT class computer?
--

192. DSP-12 users on Internet

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 20:06:32 UTC
From: bmm1@freenet.scri.fsu.edu
Message-ID: <199309152005.AA62325@freenet.scri.fsu.edu>
Source record: 28802
Cross-posted to: rec.radio.amateur.digital.misc,rec.radio.amateur.space

Are there any DSP-12 users ou there on the internet? I know there is a DSP-12 users group but the only contact I have for most of them is a phone number. I suspect that a good contact would be on the satellites themselves however I am not to the point of having reliable satellite communications. I do have internet access. If enough users are interested I *might* volunteer to manage a mailing list.

Bruce. N4USH. bmm1@freenet.fsu.edu
--

193. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 22:50:23 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748133423@afit.af.mil>
Source record: 28803

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93258.24999999 .00036093 00000-0 86022-4 0 126
2 22795 28.4632 338.9585 0022971 349.6218 99.8392 15.94634668 436
1993 058B
1 22796U 93 58 B 93258.41285176 -.00018167 00000-0 -35758-1 0 54
2 22796 15.3562 357.0380 7465464 0.0501 359.7520 2.00225257 60
1993 058D
1 22797U 93 58 D 93257.40822743 -.00000217 00000-0 99999-4 0 34
2 22797 15.4804 356.5146 7472297 359.9513 359.9406 2.01097297 41
1993 058C
1 22798U 93 58 C 93255.84373842 .00021892 00000-0 79894-4 0 13
2 22798 28.4606 357.0089 0022166 244.8563 57.6075 15.86464053 54
1993 058E
1 22799U 93 58 E 93256.85766689 .02916751 00000-0 48785-2 0 35
2 22799 28.4305 349.5217 0016725 274.5421 87.5965 15.96195614 210
1993 058F
1 22800U 93 58 F 93258.29415584 .00044033 00000-0 90668-4 0 24
2 22800 28.6263 338.5311 0043635 194.3319 170.6107 15.95958911 449
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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194. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-15 22:50:39 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748133439@afit.af.mil>
Source record: 28805
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

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STS 51
1 22795U 93 58 A 93258.24999999 .00036093 00000-0 86022-4 0 126
2 22795 28.4632 338.9585 0022971 349.6218 99.8392 15.94634668 436
1993 058B
1 22796U 93 58 B 93258.41285176 -.00018167 00000-0 -35758-1 0 54
2 22796 15.3562 357.0380 7465464 0.0501 359.7520 2.00225257 60
1993 058D
1 22797U 93 58 D 93257.40822743 -.00000217 00000-0 99999-4 0 34
2 22797 15.4804 356.5146 7472297 359.9513 359.9406 2.01097297 41
1993 058C
1 22798U 93 58 C 93255.84373842 .00021892 00000-0 79894-4 0 13
2 22798 28.4606 357.0089 0022166 244.8563 57.6075 15.86464053 54
1993 058E
1 22799U 93 58 E 93256.85766689 .02916751 00000-0 48785-2 0 35
2 22799 28.4305 349.5217 0016725 274.5421 87.5965 15.96195614 210
1993 058F
1 22800U 93 58 F 93258.29415584 .00044033 00000-0 90668-4 0 24
2 22800 28.6263 338.5311 0043635 194.3319 170.6107 15.95958911 449
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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195. Re: PB.EXE on a 4.77mhz XT?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-16 15:38:12 UTC
From: eac@world.std.com
Message-ID: <CDGE3p.C0u@world.std.com>
Source record: 28804

In <199309151852.AA42146@freenet.scri.fsu.edu> bmm1@freenet.scri.fsu.edu (Bruce M. Marshall) writes:

> I recently upgraded PB.EXE from the older version to the 4-30-92 version. The
> old version ran fine but the new version locks up my computer requiring a
> reboot.

If I remember correctly, that version of PB was compiled using 80286 instructions. It will not run on a XT with a 8088 or 8086 processor.

73 Eric WB1HBU eac@world.std.com

196. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-16 21:02:38 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748213358@afit.af.mil>
Source record: 28806

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93258.24999999 .00036093 00000-0 86022-4 0 126
2 22795 28.4632 338.9585 0022971 349.6218 99.8392 15.94634668 436
1993 058B
1 22796U 93 58 B 93258.41301780 .00010105 00000-0 20444-1 0 74
2 22796 15.3397 356.0646 7466373 0.7797 359.8777 2.00214609 68
1993 058D
1 22797U 93 58 D 93258.40273469 -.00000211 00000-0 99999-4 0 45
2 22797 15.4726 356.1292 7472131 0.6354 359.9052 2.01097246 65
1993 058C
1 22798U 93 58 C 93255.84373842 .00021892 00000-0 79894-4 0 13
2 22798 28.4606 357.0089 0022166 244.8563 57.6075 15.86464053 54
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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197. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-16 21:02:54 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748213374@afit.af.mil>
Source record: 28808
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93258.24999999 .00036093 00000-0 86022-4 0 126
2 22795 28.4632 338.9585 0022971 349.6218 99.8392 15.94634668 436
1993 058B
1 22796U 93 58 B 93258.41301780 .00010105 00000-0 20444-1 0 74
2 22796 15.3397 356.0646 7466373 0.7797 359.8777 2.00214609 68
1993 058D
1 22797U 93 58 D 93258.40273469 -.00000211 00000-0 99999-4 0 45
2 22797 15.4726 356.1292 7472131 0.6354 359.9052 2.01097246 65
1993 058C
1 22798U 93 58 C 93255.84373842 .00021892 00000-0 79894-4 0 13
2 22798 28.4606 357.0089 0022166 244.8563 57.6075 15.86464053 54
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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198. SPACE TRIVIA LIST UPDATE - 16th September, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-09-16 22:47:55 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Sep16.224755.22681@scorch.apana.org.au>
Source record: 28809
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

Well, I guess it's been awhile since the last update, but you see
I've been a bit snowed under and the newsgroups needed a little settling
down after the Mars Observer fiasco.
We've had a few excellent submissions, and I am nearly finished
Mike Collins' book 'Lift Off'. I'd also like to thank Ken Hollis for
his more than generous efforts in supplying us with some excellent
reading material for the collection of trivia.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

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*****************************************************************************
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* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
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(126) The tip of the escape tower on the Saturn V/Apollo was topped by an item
called a Q-Ball made by a company called Nortronics. That's all I know
for certain. I surmise it may have been an optical retroreflector to
get an accurate position measurement at initial lift-off, but it could

have been something more exotic. Any answers would be appreciated.
[From rriemer@nas.edu]
I believe it is like an aircraft pitot tube and measures the
value of 'Q', the dynamic air pressure. (Ever heard of MAX-Q? It is
the period of ascent during which the shuttle must throttle back due
to the thickness of the air and the speed of the orbiter.)
[From jcm@urania.harvard.edu (Jonathan McDowell)]
Discussing the escape tower.... "The extreme nose of the
cylindrical structure housed the two canards and a Q-ball, a device
equipped to sense different dynamic pressures on the nose of the
ascending vehicle and to monitor the space vehicle's angle of attack
during flight."
[Baker, David. The History of Manned Space Flight. New York: Crown
Publishers, 1981. ISBN 0-517-54377-X. Page 258.] Also,
"Saturn/Apollo" is better terminology that "Saturn V/Apollo"--the
same escape tower and Q-ball was used on the Saturn IB launches of
Apollo 7, the three Skylab missions, and Apollo/Soyuz.
[From kelvin@autodesk.com (John Walker)]

(203) The highest sustained G-load experienced by a human was when a Navy
Lieutenant by the name of Carter Collins tested his own specially
moulded Mercury couch, taking a load of 20.4G's for six seconds.
The doctors who examined him revealed that some tiny blood vessels
under the surface of the skin had ruptured, but that this was not a
serious injury and did Collins no serious harm.
[John Glenn, We Seven, 1962.]
On Decmber 10th, 1954 Lt. Col. John P. Stapp experienced (with
no permanent injury) almost 40 g deceleration on a rocket sled which
reached a peak speed of 1017 km/hour before coming to a rapid stop.
In 1958, Captain Eli L. Beeding experienced 83 g for 0.04 seconds.
[Baker, David. The History of Manned Space Flight. New York: Crown
Publishers, 1981. ISBN 0-517-54377-X. Page 26.] I don't know if
these records have been broken since 1958.
[From kelvin@autodesk.com (John Walker)]
(Can anyone check on the 'Highest load' statement, I mean that was
30 years ago!]

(234)Pete Conrad's first words from the lunar surface after landing
Apollo 12, the second landing mission, were "Whoopee! Man, that may
have been a small one for Neil, but that's a long one for me!"
Conrad is 5'7" tall.
[Baker, 369. Michael Collins: Liftoff, p. 156,
from kelvin@autodesk.com (John Walker)].

(235) One of the less-than-great moments of NASA PR during the Apollo
program was when, on Apollo 12 which, despite a lightning strike
seconds after launch (item 20), made a pinpoint landing less than
200 meters from Surveyor 3. Less than two minutes into the first
lunar EVA Pete Conrad accidentally pointed the TV camera (the first
colour TV camera sent to the surface in Apollo) at the Sun. The
vidicon tube burned out instantly. For the rest of the mission,

only radio from the surface was available. [Baker, 369].
[from kelvin@autodesk.com (John Walker)]

(236) The first attempt to launch Gordon Cooper's Faith 7 on the final mission of Project Mercury was scrubbed on May 14, 1963 due to the failure of...a diesel engine! When the time came to retract the gantry at pad 14, the engine that pulls it wouldn't start. By the time the little engine that couldn't was coaxed into operation, problems had developed at the Bermuda tracking station which required the scrub. Cooper was launched successfully the next day.
[Baker, 160. From kelvin@autodesk.com (John Walker)]

(237) Turnaround time ain't what it used to be....
1. Gemini VI was originally scheduled to rendezvous and dock with an Agena target vehicle. On October 25, 1965, the Agena was launched on its Atlas booster but exploded six minutes and 20 seconds after launch. In only *38 days*, the mission was reprogrammed into the "Spirit of 76" mission in which Gemini VI-A would rendezvous with the Gemini VII long-duration mission. Gemini VI was launched from Pad 19 on December 4, 1965 and within *eight days* the Titan booster and Gemini VI were stacked on the same pad, checked out, and counted down to launch on December 12. After a heart-stopping engine shutdown Gemini VI-A was successfully launched *three days* later, on December 15, 1965, [Baker, 219-221, 249]
2. After the loss of the Gemini VI Agena, NASA decided to build the Augmented Target Docking Adaptor (ATDA). It was approved, designed, manufactured, tested, and delivered to the Cape within *85 days*. When the Atlas booster for Gemini IX's Agena target failed on May 17, 1966, (see 148a) the ATDA was pressed into service. On June 1, 1966, only *15 days* after the failed Agena launch, another Atlas launched the ATDA and the redesignated Gemini IX-A was launched in pursuit on June 3. Unfortunately, the boost shroud failed to jettison completely, leaving the target an "angry alligator" (see 148).
[Baker, 236, 249. From kelvin@autodesk.com (John Walker)]

(238) During a Moon landing, the fuel burned by the descent stage propulsion system (8187 kg) was more than twice the dry weight of the entire Lunar Module (3900 kg).
[Baker, 299, 535. From kelvin@autodesk.com (John Walker)]

(239) Jules Verne's novels, the 1865 De la terre a la lune (From the Earth to the Moon), and 1870's Autour de la lune (Around the Moon) stand as monuments of prophecy in speculative fiction. Consider what Verne envisioned for his 19th century Moon mission versus what happened more than a century later.
a) The mission was launched from Florida.
b) There was a great rivalry between Florida and Texas to become the home of the mission.
c) The moon ship was "cylindro-conical" in shape, 9 feet in diameter and 12 feet tall, and fabricated of aluminium. (The Apollo CSM was a cylindro-conical shape, the CM was 13 feet in

diameter and 11 feet tall, fabricated of aluminium.)
d) The crew consisted of three men.
e) Carbon dioxide was scrubbed from cabin air by postassium hydroxide. (Apollo used lithium hydroxide.)
f) A suborbital test flight of subscale ship with animals on-board was conducted.
g) The launcher cannon was named "Columbiad". (Apollo 11's command module was "Columbia".)
h) It was launched in December.
i) The first mission to the Moon did not land, but went into lunar orbit.
j) Rockets were fired to escape from lunar orbit into an Earth return trajectory.
k) Upon return to the Earth, the projectile landed in the Pacific Ocean, and was picked up by a ship of the U.S. Navy.
Verne did get a few things wrong. The "wagon-projectile" was launched by a 900 foot long cannon charged with 400,000 pounds of gun-cotton (nitrocellulose), not a rocket, was lit by gaslight, and carried hunting rifles, two dogs, a rooster and six hens, and fine French wine. And the entire Moon project cost $5,446,675, raised by a worldwide public subscription.
Neil Armstrong commented upon the remarkable parallels between Verne's vision and the reality of Apollo 11 in the last in-flight television broadcast as Apollo 11 was en-route to Earth. [Jules Verne: De la terre a la Lune (ISBN 2-253-00631-9), Autour de la Lune (ISBN 2-253-00587-8). Michael Collins: Liftoff, p. 12.]
[From kelvin@autodesk.com (John Walker)]

(240) One of my favorite stories (though you should probably check out the veracity of it) is in regards to the Apollo program. Several of the early launches were on Little Joe II rockets, which were solid fuel boosters, and were designed mainly to test the escape tower system. The Little Joe II rocket was described by one NASA official as being "the most reliable booster we've ever built". On the last such flight, the fuel charge in the Little Joe II shattered several seconds before the scheduled test of the escape tower, creating a true emergency for the escape tower to handle (the escape tower worked perfectly). The Little Joe II launches, by the way, took place at White Sands Missle range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]
The incident occurred on May 19th, 1965, when the third Little Joe II, scheduled for an 89 second burn to 35 km, where the escape system would be triggered, began uncommanded rolls seconds after launch. The Apollo launch escape system triggered, as designed, and successfully returned the boilerplate Command Module to the ground. The test was repeated on January 20th, 1966, on the fourth and final Little Joe II abort test and was a complete success; the escape system extracted the Command Module from the booster at 24 km and returned it safely to the ground.
[Baker, David. The History of Manned Space Flight. New York: Crown

Publishers, Inc. 1981. ISBN 0-517-54377-X. Pages 261, 263.
From kelvin@autodesk.com.]

(241) At one time, the Gemini space craft was going to land on land rather
than on water, with a rather bizzare inflatible "hang-glider" instead
of parachutes. (I remember having a NASA publication when I was a
kid that had drawings of this configuration. It even showed the
storage compartment for the inflatible wing running between the two
hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
The device was called the "Rogallo wing", named after its
inventor Francis M. Rogallo of the Langley Research Center, who made
a presentation to Bob Gilruth about it in early 1959. It became a
key part of the concept of "Mercury Mk. II", which eventually became
the Gemini program. North American Aviation received the contract
to develop the Rogallo wing or "paraglider" in November 1961; the
original mission schedule envisioned using it from the second launch
and thereafter (the second launch was to be the first manned launch
of Gemini). The development program ran into one problem after
another: tangled lines, crashes, and schedule slips which would have
made it impossible to use the paraglider before the seventh mission.
With a total weight penalty of 360kg (including landing skids which
would deploy from the bottom of the spacecraft), and fiercely opposed
by Chris Kraft's Flight Operations Division, the paraglider effort
ground to a halt in 1964. An artifact of the paraglider remained on
Gemini--the two point suspension system that deployed from between
the crew hatches and tilted the spacecraft to a 55 degree angle for
landing, even for parachute water landings. It is the deployment of
this suspension system, not the parachute itself, which cracked Gus
Grissom's helmet visor on Gemini 3, as mentioned in item 80(b)(i).
[Baker, David. The History of Manned Space Flight. New York: Crown
Publishers, Inc., 1981. ISBN 0-517-54377-X. See pages 106-107,
175-176, and 201 including two pictures of the paraglider.
[From kelvin@autodesk.com.]

(242) The major change to the Atlas launcher for the Mercury flights of
the early 60's was the Abort Sensing System. Not happy to call it
ASS, the Air Force labelled it ASIS for Anort Sensing and
Implementation System. The people at NASA, though, thought this was
meant to be 'as is' meaning that it was basically an unmodified
ICBM.
[From 'Lift Off' by Michael Collins, pg 34]

(243) For the construction of the Mercury spacecraft, NASA engineers had
to learn how to weld Titanium 0.01 inches thick.
[From 'Lift Off' by Michael Collins, pg 36]

(244) Federal Prison specifications require a minimum cell space of some
475 cubic feet per inmate. Mercury had a habitable volume of 40
cubic feet, about the same size as a coffin.
[From 'Lift Off' by Michael Collins, pg 39]

(245) Years later, concerning the trend of sending Monkeys into orbit
before the trained astronauts, Chuck Yeager commented 'I'm
wouldn't want to sweep off Monkye shit before I sat down in that
capsule.
[From 'Lift Off' by Michael Collins, pg 46]

(246) Enos, the first Monkey to go into Orbit on board a Mercury Atlas,
should have been awarded NASA Excpeional Service Medal. Even though
he carried out all his prescribed tasks, with his good behaviour
rewarded with banana pellets and punished with electric shocks.
Half way through the flight one of the levers malfunctioned, and
ENOS received nearly 80 undeserved shocks.
[From 'Lift Off' by Michael Collins, pg 52]

(247) If Kennedy had said fly around the Moon instead of landing on it,
the basic Mercury capsule could have been stretched enough to
sustain a single astronaut on a circumlunar flight.
[From 'Lift Off' by Michael Collins, pg 67]

(248) The Gemini spacecraft had an annoying design flaw based on
economics that annoyed all the fighter pilots. There was only one
attitude controller, mounted between the two seats. Therefore the
man in the right seat had to train his hands to revere roles.
[From 'Lift Off' by Michael Collins, pg 74]

(249) The first launch of Gemini 6 was aborted due to the self-destruction
of their Agena docking target. The second attempt, as they were
on their way to chase Gemini 7, also ended in an abort, but one
fraut with excitement. The clock, which signals the start of the
mission, was ticking over but there was silence as the engines did
not start. By all interpretations of the rules, Schirra and
Stafford should have ejected, but they held tight. It was later
found that a plastic dust cover had been carelessely left INSIDE
the engine. In all likelihoor, the booster would not have had
enough thrust to get the spacecraft into orbit anyway!
[From 'Lift Off' by Michael Collins, pg 88,89]

(250) On their ascent into orbit, Young and Collins, on Gemini 10,
experienced an explosion of the first stage. Fortunately, it
was just after the ignition of the second stage blasting into
the top of the first, causing the oxidiser tank to explode.
[From 'Lift Off' by Michael Collins, pg 95]

(251) Each Solid Rocket Booster has a system tunnel that provides
protection and mechanical support for cables associated with the
electrical and instrumentation subsystem. The tunnel extends almost
the entire length of the booster. Weighing 457kg, around
41metres in length, 25cm wide and an 10cm thick. It is constructed
of an aluminium alloy slightly thicker than a filing cabinet wall.
[NASA - Space Shuttle News Reference.]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
****
****

(9) There is also another story of the original white ET's. Apparently the
white (for some reason only white and not the current brown / orange
ones) attracted woodpeckers. They LOVED the tank, and they loved
pecking on it. Probably not a bright idea, but since they are birds...
[From HOLLIS@TITAN.KSC.NASA.GOV]

****
****
* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an

extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(Can anyone come up with some sources for backing up/refuting the last
three items?)

****

(255)

199. Looking Glass

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 06:35:50 UTC
From: jtdickin@ouray
Message-ID: <7585@copper.Denver.Colorado.EDU>
Source record: 28807

Does anyone know where I can get some good looking glass photo's of Denver area??

200. Satellite reception.

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 12:31:24 UTC
From: trevor@terminus.ericsson.se
Message-ID: <1993Sep17.123124.5375@terminus.ericsson.se>
Source record: 28810

I have recently bought a Scanner and was wondering about receiving satellite telemetry data. Does anybody know of any good books detailing frequencies, type of modulation, protocols/data formats, reception times, hardware requirements etc.

Thanking you in advance

Trevor Sutton

201. * SpaceNews 20-Sep-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 17:15:00 UTC
From: John Magliacane <kd2bd@ka2qhd.ocpt.ccur.com>
Message-ID: <$spc0920@ampr.org>
Source record: 28618
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC0920
* SpaceNews 20-Sep-93 *

BID: $SPC0920

=========
SpaceNews
=========

MONDAY SEPTEMBER 20, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* MARS OBSERVER NOTES *
======================
The last known commands known to be received by Mars Observer was on August 20 when the orbit insertion sequence was uplinked. On August 21 at about 6PM, no signal was received from the spacecraft after the tanks were pressurized. The spacecraft has not been heard from since.

Prior to pressurizing the fuel tanks for orbit insertion, the transmitter was turned off to protect the filament in the transmitter. This is a common practice for any high-shock event and was recommended by Martin Marietta. The transmitter has been turned off and on in four previous occasions for the three trajectory correction maneuvers and deployment of the High Gain Antenna.

The odds of the fuel tank exploding is under 0.1% (or under 1 in a 1000). The pressurization sequence is started by activating the helium via dual pyro valves to pressurize the tanks to 264 psia. The nitrogen tetroxide (N2O4) is pressurized first, clearing the helium lines of the oxidizer. The monomethyl hydrazine tank is then pressurized. Dual series pressure regulators prevent overpressurization and dual check valves prevent the hypergolic propellants from mixing through the pressurization tubing.

Attempts were made to view to thruster firing of Mars Observer with two infrared telescopes in Hawaii, but the attempts were thwarted by cloud cover. The Hubble Space Telescope was also considered, but it was on the wrong side of the Earth and would have had to point closer to the Sun than was desired.

If Mars Observer did not execute its orbit insertion burn on August 24, it would have flown by Mars but remained in an elliptical orbit around the Sun between the Earth and Mars. Opportunities to enter

Mars orbit may occur 10 months to 2 year from now, provided the spacecraft can be recovered.

The possibility exists that the Mars Observer may have entered orbit around Mars on its own.

If Mars Observer was not maintaining proper attitude and the solar arrays were not pointed at the Sun, the spacecraft would last about 7 days before running out of electrical power.

If Mars Observer is lost, then the Russian Mars '94 mission would lose about half of its science data, since Mars Observer was to act as a communications relay for the Mars '94 mission. Also, the Mars '96 mission may have to be redesigned.

If Mars Observer is not recovered, it will be the first post-launch failure of a NASA planetary spacecraft since Surveyor 7 in 1967, a period spanning 26 years.

[Info via Ron Baalke at JPL]

* FO-20 SCHEDULE *
==========
The following is the latest FO-20 mode JA transponder schedule from the JARL:

22-Sep-93 08:30 through 24-Sep-93 09:05 UTC
29-Sep-93 08:50 through 30-Sep-93 09:11 UTC

[Info via 73 Richard, G3RWL]

* VATICAN ACTIVE ON AO-13 *
==========
Pino (I0DUD), Antonio (I0JX) and Eric (WB6GYD) will be conducting AO-13 Mode B operations from the Vatican on Saturday, September 25 starting approximately 0500Z and again on Sunday, September 26 (They are unsure of the operating time on Sunday). The call sign will be announced at that time and a QSL route will be established. This operation was previously announced in an Oscar Satellite Report. In addition, they plan to spend Friday night (probably 2000-0500Z 9/24-25) at the Vatican and operate 20/30/40 meters, so look for them there.

[Info via Eric Archer, WB6GYD]

* AMSAT-SA NEWS *
==========
Hans van de Groenendaal, ZS6AKV, was re-elected as the President of SA AMSAT at the society's Annual general meeting held in Johannesburg on September 11.

The AGM was held after the 14th annual Space Communications Conference - SPACECON 93.

The conference was attended by 60 delegates and featured a major update on SUNSAT, the University of Stellenbosch Satellite. Other papers covered Digital Signal Processing, How to solve intermod interference on 2m Satellite

Downlinks, Using 29MHz satellite signals to study propagation, Phase 3D Update, and many others.

[Info via Hans van de Groenendaal, ZS6AKV]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

G0KTN WA1GUD ZS1RON KB2GGS N2KOJ WB2COP KA3UNR PA3GCK KD4EMI WD4AHZ N5HTQ SM5ENX F6HTJ N6ZOP VS6XFK

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

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MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

202. ORBS$261.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 18:37:20 UTC
From: Richard Campbell <G_RCAMPBELL@qualcomm.com>
Message-ID: <$orbs-261.o@ampr.org>
Source record: 28620
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-261.O
Orbital Elements 261.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX September 18, 1993
BID: $ORBS-261.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93259.42949630
Element set: 33
Inclination: 27.1446 deg
RA of node: 5.6618 deg
Eccentricity: 0.6021589
Arg of perigee: 114.5953 deg
Mean anomaly: 317.8249 deg
Mean motion: 2.05878539 rev/day
Decay rate: -4.6e-07 rev/day^2
Epoch rev: 7714
Checksum: 320

Satellite: UO-11
Catalog number: 14781
Epoch time: 93259.57002690
Element set: 438
Inclination: 97.8060 deg
RA of node: 281.9085 deg
Eccentricity: 0.0013088
Arg of perigee: 64.5925 deg
Mean anomaly: 295.6635 deg
Mean motion: 14.69053438 rev/day
Decay rate: 1.70e-06 rev/day^2
Epoch rev: 51013
Checksum: 316

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93257.90869970
Element set: 648
Inclination: 82.9280 deg
RA of node: 172.3049 deg
Eccentricity: 0.0013313
Arg of perigee: 68.8094 deg
```

Mean anomaly: 291.4476 deg
Mean motion: 13.72323085 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 31215
Checksum: 323

Satellite: AO-13
Catalog number: 19216
Epoch time: 93250.49598972
Element set: 641
Inclination: 57.8702 deg
RA of node: 296.0121 deg
Eccentricity: 0.7208616
Arg of perigee: 323.7398 deg
Mean anomaly: 4.4692 deg
Mean motion: 2.09716778 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 4008
Checksum: 324

Satellite: FO-20
Catalog number: 20480
Epoch time: 93250.03648670
Element set: 455
Inclination: 99.0294 deg
RA of node: 90.6876 deg
Eccentricity: 0.0539922
Arg of perigee: 261.2006 deg
Mean anomaly: 92.7624 deg
Mean motion: 12.83220718 rev/day
Decay rate: -1.5e-07 rev/day^2
Epoch rev: 16781
Checksum: 304

Satellite: AO-21
Catalog number: 21087
Epoch time: 93258.82210440
Element set: 851
Inclination: 82.9462 deg
RA of node: 345.7517 deg
Eccentricity: 0.0036538
Arg of perigee: 127.3942 deg
Mean anomaly: 233.0529 deg
Mean motion: 13.74524611 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 13189
Checksum: 303

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93255.86883278

Element set: 421
Inclination: 82.9210 deg
RA of node: 217.0842 deg
Eccentricity: 0.0028867
Arg of perigee: 157.6305 deg
Mean anomaly: 202.6117 deg
Mean motion: 13.74026218 rev/day
Decay rate: 1.4e-07 rev/day^2
Epoch rev: 13056
Checksum: 296

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93241.80475365
Element set: 21
Inclination: 1.3018 deg
RA of node: 119.8566 deg
Eccentricity: 0.2933615
Arg of perigee: 152.1382 deg
Mean anomaly: 232.4293 deg
Mean motion: 1.42202460 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 162
Checksum: 258

/EX
SB KEPS @ AMSAT $ORBS-261.D
Orbital Elements 261.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX September 18, 1993
BID: $ORBS-261.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93259.67801905
Element set: 771
Inclination: 98.6102 deg
RA of node: 342.9259 deg
Eccentricity: 0.0010237
Arg of perigee: 276.7534 deg
Mean anomaly: 83.2510 deg
Mean motion: 14.29791555 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 19050
Checksum: 310

Satellite: AO-16
Catalog number: 20439
Epoch time: 93260.09418943
Element set: 576

Inclination: 98.6177 deg
RA of node: 344.3011 deg
Eccentricity: 0.0010498
Arg of perigee: 276.0813 deg
Mean anomaly: 83.9175 deg
Mean motion: 14.29849667 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 19057
Checksum: 329

Satellite: DO-17
Catalog number: 20440
Epoch time: 93259.72504322
Element set: 578
Inclination: 98.6179 deg
RA of node: 344.1719 deg
Eccentricity: 0.0010642
Arg of perigee: 276.9065 deg
Mean anomaly: 83.0906 deg
Mean motion: 14.29986108 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 19053
Checksum: 314

Satellite: WO-18
Catalog number: 20441
Epoch time: 93259.83579292
Element set: 580
Inclination: 98.6179 deg
RA of node: 344.3024 deg
Eccentricity: 0.0011341
Arg of perigee: 277.0277 deg
Mean anomaly: 82.9614 deg
Mean motion: 14.29964956 rev/day
Decay rate: 2.4e-07 rev/day^2
Epoch rev: 19055
Checksum: 330

Satellite: LO-19
Catalog number: 20442
Epoch time: 93254.23450415
Element set: 575
Inclination: 98.6187 deg
RA of node: 338.9526 deg
Eccentricity: 0.0011692
Arg of perigee: 294.2082 deg
Mean anomaly: 65.7878 deg
Mean motion: 14.30055360 rev/day
Decay rate: 3.4e-07 rev/day^2
Epoch rev: 18976
Checksum: 324

Satellite: UO-22
Catalog number: 21575
Epoch time: 93258.21651950
Element set: 275
Inclination: 98.4663 deg
RA of node: 332.8513 deg
Eccentricity: 0.0008598
Arg of perigee: 35.8209 deg
Mean anomaly: 324.3553 deg
Mean motion: 14.36850048 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 11359
Checksum: 317

Satellite: KO-23
Catalog number: 22077
Epoch time: 93249.13704215
Element set: 114
Inclination: 66.0790 deg
RA of node: 154.7002 deg
Eccentricity: 0.0000483
Arg of perigee: 354.1910 deg
Mean anomaly: 5.9105 deg
Mean motion: 12.86279206 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5025
Checksum: 242

/EX
SB KEPS @ AMSAT $ORBS-261.W
Orbital Elements 261.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX September 18, 1993
BID: $ORBS-261.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93259.74309729
Element set: 460
Inclination: 99.0926 deg
RA of node: 301.4687 deg
Eccentricity: 0.0014290
Arg of perigee: 272.1904 deg
Mean anomaly: 87.7636 deg
Mean motion: 14.13545037 rev/day
Decay rate: 5.9e-07 rev/day^2
Epoch rev: 45171
Checksum: 325

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93259.71206390
Element set: 303
Inclination: 98.5179 deg
RA of node: 272.0121 deg
Eccentricity: 0.0014229
Arg of perigee: 49.3707 deg
Mean anomaly: 310.8720 deg
Mean motion: 14.24831329 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 36366
Checksum: 295

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93259.66276955
Element set: 213
Inclination: 99.1420 deg
RA of node: 237.3143 deg
Eccentricity: 0.0011336
Arg of perigee: 178.2684 deg
Mean anomaly: 181.8511 deg
Mean motion: 14.12916030 rev/day
Decay rate: 1.54e-06 rev/day^2
Epoch rev: 25659
Checksum: 298

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93260.03190166
Element set: 735
Inclination: 82.5497 deg
RA of node: 100.0854 deg
Eccentricity: 0.0014865
Arg of perigee: 250.1871 deg
Mean anomaly: 109.7648 deg
Mean motion: 13.16023498 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18718
Checksum: 293

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93257.93942524
Element set: 628
Inclination: 98.8547 deg
RA of node: 281.6234 deg
Eccentricity: 0.0016605
Arg of perigee: 61.8397 deg
Mean anomaly: 298.4445 deg
Mean motion: 14.01292439 rev/day
Decay rate: -8.0e-08 rev/day^2

Epoch rev: 15515
Checksum: 336

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93259.80511230
Element set: 582
Inclination: 82.5244 deg
RA of node: 3.4858 deg
Eccentricity: 0.0014279
Arg of perigee: 90.4112 deg
Mean anomaly: 269.8684 deg
Mean motion: 13.83557223 rev/day
Decay rate: 2.4e-07 rev/day^2
Epoch rev: 14995
Checksum: 305

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93256.82905783
Element set: 401
Inclination: 82.5445 deg
RA of node: 4.9697 deg
Eccentricity: 0.0013624
Arg of perigee: 151.6360 deg
Mean anomaly: 208.5507 deg
Mean motion: 13.16454961 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11499
Checksum: 299

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93259.62098399
Element set: 668
Inclination: 98.6511 deg
RA of node: 288.0337 deg
Eccentricity: 0.0012596
Arg of perigee: 313.6703 deg
Mean anomaly: 46.3448 deg
Mean motion: 14.22310141 rev/day
Decay rate: 1.28e-06 rev/day^2
Epoch rev: 12164
Checksum: 301

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93259.22463762
Element set: 458
Inclination: 82.5526 deg
RA of node: 310.2198 deg

Eccentricity: 0.0013121
Arg of perigee: 156.9113 deg
Mean anomaly: 203.2601 deg
Mean motion: 13.16823804 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10040
Checksum: 263

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93259.09859596
Element set: 13
Inclination: 82.5452 deg
RA of node: 63.6357 deg
Eccentricity: 0.0021195
Arg of perigee: 275.6959 deg
Mean anomaly: 84.1782 deg
Mean motion: 13.82985365 rev/day
Decay rate: 2.0e-07 rev/day^2
Epoch rev: 220
Checksum: 323

/EX
SB KEPS @ AMSAT $ORBS-261.M
Orbital Elements 261.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX September 18, 1993
BID: $ORBS-261.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93259.97340085
Element set: 304
Inclination: 51.6196 deg
RA of node: 118.3481 deg
Eccentricity: 0.0004782
Arg of perigee: 101.3001 deg
Mean anomaly: 258.8522 deg
Mean motion: 15.59749139 rev/day
Decay rate: 8.323e-05 rev/day^2
Epoch rev: 43345
Checksum: 302

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93258.68191761
Element set: 181
Inclination: 28.4701 deg
RA of node: 200.9986 deg
Eccentricity: 0.0004316

```
Arg of perigee: 272.8522 deg
Mean anomaly: 87.1591 deg
Mean motion: 14.92826359 rev/day
Decay rate: 5.23e-06 rev/day^2
Epoch rev: 18505
Checksum: 307

Satellite: GRO
Catalog number: 21225
Epoch time: 93259.62659304
Element set: 991
Inclination: 28.4612 deg
RA of node: 348.9177 deg
Eccentricity: 0.0004286
Arg of perigee: 281.0632 deg
Mean anomaly: 78.9543 deg
Mean motion: 15.76479502 rev/day
Decay rate: 3.0305e-04 rev/day^2
Epoch rev: 1454
Checksum: 312

Satellite: UARS
Catalog number: 21701
Epoch time: 93247.37464806
Element set: 255
Inclination: 56.9828 deg
RA of node: 224.1299 deg
Eccentricity: 0.0003966
Arg of perigee: 86.4471 deg
Mean anomaly: 273.7082 deg
Mean motion: 14.96117854 rev/day
Decay rate: -7.72e-06 rev/day^2
Epoch rev: 10815
Checksum: 323

/EX
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```

203. Two-Line Orbital Element Sets (TLE261)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 21:57:16 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748303036@afit.af.mil>
Source record: 28619
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #261 -
Alouette 1
1 00424U 62 49 A 93259.84471933 .00000040 00000-0 43586-4 0 7361
2 00424 80.4635 194.6756 0023865 95.8612 264.5254 13.67780835545034
ATS 3
1 03029U 67111 A 93254.34796154 -.00000080 00000-0 99999-4 0 9765
2 03029 14.4486 10.2930 0011732 254.0145 105.9237 1.00273115 94643
Cosmos 398
1 04966U 71 16 A 93259.56376417 .00078563 29445-4 21590-3 0 4461
2 04966 51.4770 275.4208 1293142 310.1233 39.3116 13.25493513735604
Starlette
1 07646U 75010 A 93257.82840509 -.00000081 00000-0 -15708-4 0 5338
2 07646 49.8212 159.9431 0206321 146.9491 214.4492 13.82183467939764
LAGEOS
1 08820U 76039 A 93253.43355861 .00000005 00000-0 99999-4 0 6968
2 08820 109.8626 39.7459 0044179 345.3569 14.5691 6.38663863149288
ETS-2
1 09852U 77014 A 93235.43683811 -.00000145 00000-0 99999-4 0 7751
2 09852 11.6127 45.0617 0002444 53.2545 306.8403 0.99999585 7683
GOES 2
1 10061U 77048 A 93256.31147601 .00000102 00000-0 99999-4 0 603
2 10061 10.6785 49.0508 0001584 67.0005 212.9415 1.00282405 4346
IUE
1 10637U 78012 A 93259.43087034 -.00000193 00000-0 00000+0 0 7803
2 10637 34.1743 99.4020 1308088 27.6774 331.8878 1.00290122 9987
GPS-0001
1 10684U 78020 A 93246.97185663 -.00000007 00000-0 99999-4 0 555
2 10684 64.4732 54.0241 0064458 163.2200 197.0153 1.98069722 99260
GPS-0002
1 10893U 78 47 A 93253.52975176 -.00000010 00000-0 99999-4 0 8081
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2 10893 63.6874 293.3716 0207761 13.4947 347.1114 2.01627581112433
GOES 3
1 10953U 78062 A 93254.81701553 .00000093 00000-0 99999-4 0 7960
2 10953 9.5979 51.8004 0006364 75.6180 341.5791 1.00275426 8930
SeaSat 1
1 10967U 78064 A 93257.55819440 .00000099 00000-0 53656-4 0 9953
2 10967 108.0082 251.7423 0002261 279.9633 80.1254 14.37869527796743
GPS-0003
1 11054U 78093 A 93252.63519969 -.00000009 00000-0 99999-4 0 9402
2 11054 63.4022 290.0263 0044115 175.2393 184.8755 1.93505267109081
Nimbus 7
1 11080U 78098 A 93257.67562617 -.00000001 00000-0 14730-4 0 1294
2 11080 99.0910 146.0601 0009141 145.1151 215.0606 13.83719347751976
GPS-0004
1 11141U 78112 A 93253.41519844 -.00000007 00000-0 99999-4 0 6236
2 11141 64.4747 54.6074 0048689 25.2567 335.0024 1.92894964107603
GPS-0005
1 11690U 80 11 A 93259.16978168 -.00000006 00000-0 99999-4 0 5690
2 11690 64.8375 55.5625 0140231 198.4801 161.0786 2.00552376114041
GPS-0006
1 11783U 80 32 A 93255.78824793 -.00000008 00000-0 99999-4 0 7755
2 11783 62.8107 287.5182 0204207 29.0570 332.1772 2.03457007 98311
GOES 5
1 12472U 81049 A 93255.54273922 .00000068 00000-0 99999-4 0 5489
2 12472 6.2444 61.2272 0004298 13.7702 346.4598 1.00216204 2985
Cosmos 1383
1 13301U 82 66 A 93258.76480519 .00000021 00000-0 17411-4 0 551
2 13301 82.9334 150.9635 0027668 127.9912 232.3744 13.68043028559906
LandSat 4
1 13367U 82 72 A 93257.76686744 .00000078 00000-0 22353-4 0 8558
2 13367 98.2192 315.6580 0007924 35.5757 324.5975 14.57111060593957
IRAS
1 13777U 83 4 A 93258.60678057 .00000128 00000-0 99999-4 0 3923
2 13777 98.9806 90.1832 0014936 352.7356 7.3590 13.99177548212838
Cosmos 1447
1 13916U 83 21 A 93257.99152202 .00000020 00000-0 14818-4 0 1361
2 13916 82.9431 215.2072 0039607 75.3879 285.1660 13.74294534525532
TDRS 1
1 13969U 83 26 B 93256.31962343 .00000119 00000-0 99999-4 0 488
2 13969 7.1535 53.9251 0002787 61.0481 181.4068 1.00271640 11281
GOES 6
1 14050U 83 41 A 93259.11985685 -.00000228 00000-0 99999-4 0 9450
2 14050 5.0346 63.9772 0002535 340.5570 278.7365 1.00266605 10042
OSCAR 10
1 14129U 83 58 B 93259.42949630 -.00000046 00000-0 99999-4 0 335
2 14129 27.1446 5.6618 6021589 114.5953 317.8249 2.05878539 49170
GPS-0008
1 14189U 83 72 A 93149.63940343 -.00000008 00000-0 99999-4 0 4679
2 14189 63.9879 54.1319 0135726 236.1393 123.3793 2.00563668 72374
LandSat 5
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1 14780U 84 21 A 93257.80601675 .00000036 00000-0 13024-4 0 6613
2 14780 98.2020 317.4469 0005417 43.7243 316.4389 14.57115545507371
UoSat 2
1 14781U 84 21 B 93259.57002690 .00000170 00000-0 32891-4 0 4386
2 14781 97.8060 281.9085 0013088 64.5925 295.6635 14.69053438510136
GPS-0009
1 15039U 84 59 A 93258.50429461 -.00000010 00000-0 99999-4 0 9296
2 15039 63.8100 49.6582 0052395 216.4713 143.1717 2.00562342 67832
Cosmos 1574
1 15055U 84 62 A 93258.52852057 .00000028 00000-0 23795-4 0 3878
2 15055 82.9562 267.5877 0026331 263.1132 96.7028 13.73591277462925
GPS-0010
1 15271U 84 97 A 93253.45437820 -.00000008 00000-0 99999-4 0 5645
2 15271 62.5200 287.4652 0136688 344.6418 15.0209 2.00572955 64843
Cosmos 1602
1 15331U 84105 A 93258.18827016 .00000330 00000-0 37894-4 0 612
2 15331 82.5362 335.1593 0022083 34.3505 325.9149 14.84130424483723
NOAA 9
1 15427U 84123 A 93259.74309729 .00000059 00000-0 41728-4 0 4609
2 15427 99.0926 301.4687 0014290 272.1904 87.7636 14.13545037451714
GPS-0011
1 16129U 85 93 A 93253.18684913 -.00000008 00000-0 99999-4 0 2986
2 16129 64.5576 51.7890 0131771 141.5118 219.4627 2.00564264 4548
Mir
1 16609U 86 17 A 93259.97340085 .00008323 00000-0 10814-3 0 3041
2 16609 51.6196 118.3481 0004782 101.3001 258.8522 15.59749139433459
SPOT 1
1 16613U 86 19 A 93258.76868121 .00000114 00000-0 62355-4 0 2205
2 16613 98.7200 331.8827 0000748 88.5949 271.5284 14.20033154 77612
Cosmos 1766
1 16881U 86 55 A 93258.40085575 .00000201 00000-0 23173-4 0 9127
2 16881 82.5176 33.0860 0021177 55.0025 305.3174 14.83164196384720
EGP
1 16908U 86 61 A 93248.04406455 -.00000025 00000-0 99999-4 0 6645
2 16908 50.0127 241.0374 0011059 301.9979 57.9781 12.44408264321262
NOAA 10
1 16969U 86 73 A 93259.71206390 .00000051 00000-0 30111-4 0 3036
2 16969 98.5179 272.0121 0014229 49.3707 310.8720 14.24831329363667
MOS-1
1 17527U 87 18 A 93259.76831866 .00000135 00000-0 12493-3 0 6201
2 17527 99.0670 328.7327 0000471 23.4798 336.6202 13.94891799334824
GOES 7
1 17561U 87 22 A 93254.59268439 -.00000020 00000-0 99999-4 0 3994
2 17561 0.9277 78.6561 0003456 358.7108 14.1817 1.00275307 7183
Kvant-1
1 17845U 87 30 A 93259.90933664 .00008838 00000-0 11443-3 0 4292
2 17845 51.6185 118.6771 0004757 92.0606 268.1047 15.59745108433441
DMSP B5D2-3
1 18123U 87 53 A 93257.23260358 .00000052 00000-0 36264-4 0 9164
2 18123 98.7938 87.9262 0013311 247.9998 111.9763 14.15305689321974
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RS-10/11
1 18129U 87 54 A 93257.90869970 .00000088 00000-0 89554-4 0 6481
2 18129 82.9280 172.3049 0013313 68.8094 291.4476 13.72323085312153
Meteor 2-16
1 18312U 87 68 A 93258.94697677 .00000027 00000-0 18483-4 0 286
2 18312 82.5527 69.3595 0012131 156.1048 204.0681 13.84006599307125
Meteor 2-17
1 18820U 88 5 A 93258.65748794 .00000045 00000-0 34464-4 0 8877
2 18820 82.5451 126.9744 0015247 232.5055 127.4710 13.84693516284361
DMSP B5D2-4
1 18822U 88 6 A 93257.34574214 .00000076 00000-0 42109-4 0 8182
2 18822 98.4772 118.2043 0007529 69.0586 291.1403 14.22878317291292
Glonass 34
1 19163U 88 43 A 93256.08782224 .00000015 00000-0 99999-4 0 6926
2 19163 64.9649 119.7247 0006645 166.9611 193.2611 2.13102774 40758
Glonass 36
1 19165U 88 43 C 93255.67420497 .00000015 00000-0 99999-4 0 8947
2 19165 64.9588 119.7283 0004307 331.9760 28.0969 2.13102309 41367
METEOSAT 3
1 19215U 88 51 A 93254.46122461 -.00000227 00000-0 99999-4 0 6470
2 19215 1.1123 73.8393 0002530 213.1810 153.9224 1.00289774 7110
AO-13
1 19216U 88 51 B 93250.49598972 .00000071 00000-0 -13073-2 0 6412
2 19216 57.8702 296.0121 7208616 323.7398 4.4692 2.09716778 8589
OKEAN 1
1 19274U 88 56 A 93258.62277290 .00000262 00000-0 31579-4 0 6123
2 19274 82.5163 132.4974 0018957 189.0747 171.0129 14.81962254280414
Meteor 3-2
1 19336U 88 64 A 93258.90304104 .00000043 00000-0 99999-4 0 612
2 19336 82.5448 157.7729 0015858 229.6325 130.3414 13.16961116247159
Glonass 39
1 19503U 88 85 C 93238.33552745 -.00000022 00000-0 99999-4 0 9484
2 19503 65.7566 359.2443 0007046 180.9202 179.0789 2.13102216 38486
NOAA 11
1 19531U 88 89 A 93259.66276955 .00000154 00000-0 93369-4 0 2139
2 19531 99.1420 237.3143 0011336 178.2684 181.8511 14.12916030256598
TDRS 2
1 19548U 88 91 B 93256.22138834 -.00000260 00000-0 99999-4 0 6781
2 19548 0.3926 80.4983 0001692 79.5271 210.1164 1.00274496 5430
Glonass 40
1 19749U 89 1 A 93256.20778448 .00000015 00000-0 99999-4 0 1709
2 19749 64.9221 119.3216 0005379 263.0663 96.9712 2.13101698 36395
Glonass 41
1 19750U 89 1 B 93254.85704184 .00000015 00000-0 99999-4 0 8916
2 19750 64.9376 119.4263 0006958 254.0053 106.0011 2.13101919 36366
GPS BII-01
1 19802U 89 13 A 93254.02676735 .00000014 00000-0 99999-4 0 6823
2 19802 55.0586 150.7759 0035846 175.0353 185.0549 2.00562211 33451
Akebono
1 19822U 89 16 A 93260.10128139 .00024449 00000-0 13582-2 0 9186
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2 19822 75.1030 335.5459 3857201 130.0884 270.7817 7.70961945 88134
Meteor 2-18
1 19851U 89 18 A 93258.35476554 .00000027 00000-0 18979-4 0 8251
2 19851 82.5194 3.0268 0013434 282.3642 77.6014 13.84342881229668
MOP-1
1 19876U 89 20 B 93255.07963233 .00000009 00000-0 00000+0 0 5777
2 19876 0.2748 17.6634 0001505 166.7431 194.2121 1.00270984 4342
TDRS 3
1 19883U 89 21 B 93254.19899950 -.00000241 00000-0 00000+0 0 6581
2 19883 0.0414 91.8229 0002796 92.7057 196.3879 1.00269984 86685
GPS BII-02
1 20061U 89 44 A 93253.37062027 -.00000030 00000-0 99999-4 0 6487
2 20061 54.7847 327.8604 0122987 203.0421 156.4656 2.00564683 31187
Nadezhda 1
1 20103U 89 50 A 93260.04144065 .00000029 00000-0 24023-4 0 7705
2 20103 82.9621 129.2048 0037935 333.0188 26.8994 13.73824557210809
GPS BII-03
1 20185U 89 64 A 93254.20033754 .00000014 00000-0 99999-4 0 6148
2 20185 54.8848 151.4351 0007453 231.9190 128.0674 2.00558417 29774
GMS 4
1 20217U 89 70 A 93258.75833698 -.00000256 00000-0 99999-4 0 6981
2 20217 0.0825 257.7640 0000209 80.9511 69.3334 1.00273886 15341
GPS BII-04
1 20302U 89 85 A 93254.23570929 -.00000007 00000-0 99999-4 0 6160
2 20302 53.7556 268.3604 0006846 311.0563 48.9285 2.00559380 28572
Meteor 3-3
1 20305U 89 86 A 93260.03190166 .00000043 00000-0 99999-4 0 7351
2 20305 82.5497 100.0854 0014865 250.1871 109.7648 13.16023498187180
COBE
1 20322U 89 89 A 93258.93867546 -.00000138 00000-0 -77033-4 0 7219
2 20322 98.9920 273.4965 0008169 317.7187 42.3349 14.03417723195925
Kvant-2
1 20335U 89 93 A 93259.97340801 .00009896 00000-0 12736-3 0 5329
2 20335 51.6176 118.3538 0004713 86.8677 273.3053 15.59748480433450
GPS BII-05
1 20361U 89 97 A 93254.74227125 .00000001 00000-0 99999-4 0 5657
2 20361 55.3708 93.3675 0070533 99.0055 261.8763 2.00566755 18065
SPOT 2
1 20436U 90 5 A 93258.80779094 .00000120 00000-0 65160-4 0 3258
2 20436 98.6955 332.3712 0000311 61.2290 298.8899 14.20042585189153
UO-14
1 20437U 90 5 B 93259.67801905 .00000046 00000-0 25689-4 0 7716
2 20437 98.6102 342.9259 0010237 276.7534 83.2510 14.29791555190507
UO-15
1 20438U 90 5 C 93259.20816411 .00000010 00000-0 11789-4 0 5764
2 20438 98.6115 341.7239 0009411 282.0163 77.9965 14.29142589190373
PACSAT
1 20439U 90 5 D 93260.09418943 .00000030 00000-0 19652-4 0 5761
2 20439 98.6177 344.3011 0010498 276.0813 83.9175 14.29849667190574
DO-17
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1 20440U 90 5 E 93259.72504322 .00000030 00000-0 19635-4 0 5781
2 20440 98.6179 344.1719 0010642 276.9065 83.0906 14.29986108190531
WO-18
1 20441U 90 5 F 93259.83579292 .00000024 00000-0 17161-4 0 5800
2 20441 98.6179 344.3024 0011341 277.0277 82.9614 14.29964956190550
LO-19
1 20442U 90 5 G 93257.24309458 .00000033 00000-0 20332-4 0 5768
2 20442 98.6186 341.9307 0011603 284.6681 75.3215 14.30055702190195
GPS BII-06
1 20452U 90 8 A 93254.15026678 .00000011 00000-0 99999-4 0 6042
2 20452 54.1018 207.8674 0049641 69.5050 291.0236 2.00560333 26550
MOS-1B
1 20478U 90 13 A 93257.73377124 .00000117 00000-0 99999-4 0 3110
2 20478 99.0644 330.8589 0000936 74.9354 285.1932 13.94884479104249
DEBUT
1 20479U 90 13 B 93251.09134517 .00000006 00000-0 42785-4 0 5065
2 20479 99.0285 91.6114 0539813 258.6761 95.3245 12.83306998167958
FO-20
1 20480U 90 13 C 93250.03648670 -.00000015 00000-0 -44580-5 0 4551
2 20480 99.0294 90.6876 0539922 261.2006 92.7624 12.83220718167819
MOS-1B R/B
1 20491U 90 13 D 93255.17991803 .00000320 00000-0 64730-3 0 7357
2 20491 99.0538 131.9137 0470276 139.3377 224.3864 13.02974823170451
LACE
1 20496U 90 15 A 93259.19326262 .00002455 00000-0 83965-4 0 1550
2 20496 43.1061 164.5202 0012865 31.6266 328.5358 15.31234430199496
Nadezhda 2
1 20508U 90 17 A 93260.05562478 .00000039 00000-0 34658-4 0 7124
2 20508 82.9519 263.8647 0043272 282.1580 77.4729 13.73459683178057
OKEAN 2
1 20510U 90 18 A 93258.02545424 .00000220 00000-0 28705-4 0 620
2 20510 82.5217 80.3600 0019967 14.3005 345.8768 14.78140033191011
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1 20523U 90 21 A 93255.60867038 -.00000217 00000-0 99999-4 0 1224
2 20523 0.0343 341.2795 0000717 215.1198 339.8336 1.00269066 5838
GPS BII-07
1 20533U 90 25 A 93255.55253283 -.00000029 00000-0 99999-4 0 6130
2 20533 55.0745 328.1907 0039312 86.4468 274.1003 2.00559547 25354
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1 20546U 90 28 A 93258.76094596 .00004732 00000-0 12826-3 0 3902
2 20546 94.1263 144.0714 0080490 261.4658 97.7465 15.34476000190129
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1 20580U 90 37 B 93258.68191761 .00000523 00000-0 42011-4 0 1815
2 20580 28.4701 200.9986 0004316 272.8522 87.1591 14.92826359185054
MACSAT 2
1 20608U 90 43 B 93257.79837776 .00000250 00000-0 41847-4 0 7445
2 20608 89.9259 182.0442 0106570 335.1925 24.4186 14.64556853178972
Glonass 44
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2 20619 65.3409 358.2888 0025135 211.0764 148.8065 2.13103069 25921
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1 20620U 90 45 B 93259.51135552 -.00000022 00000-0 00000+0 0 7805
2 20620 65.3362 358.2826 0006061 45.0022 315.0799 2.13102940 25932
Glonass 46
1 20621U 90 45 C 93239.39634755 -.00000022 00000-0 99999-4 0 4008
2 20621 65.3372 358.9925 0013967 194.5134 165.4469 2.13101120 25501
Kristall
1 20635U 90 48 A 93259.90933742 .00005865 00000-0 74897-4 0 3337
2 20635 51.6187 118.6769 0004537 87.8875 272.2755 15.59739529433449
ROSAT
1 20638U 90 49 A 93260.03229844 .00000549 00000-0 46346-4 0 8290
2 20638 52.9882 138.3622 0010945 325.0967 34.9303 15.06376375180904
Meteor 2-19
1 20670U 90 57 A 93258.90893110 .00000024 00000-0 15938-4 0 5772
2 20670 82.5432 66.3279 0015086 193.8621 166.2131 13.84179133162676
CRRES
1 20712U 90 65 A 93257.37414062 .00000115 00000-0 16148-3 0 3999
2 20712 18.1244 300.8205 7194900 341.9517 2.2490 2.34777240 19409
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1 20724U 90 68 A 93254.37372168 .00000014 00000-0 99999-4 0 5145
2 20724 54.7081 149.1533 0106568 153.2515 207.3651 2.00563043 22759
Feng Yun1-2
1 20788U 90 81 A 93257.93942524 -.00000008 00000-0 63356-5 0 6283
2 20788 98.8547 281.6234 0016605 61.8397 298.4445 14.01292439155154
Meteor 2-20
1 20826U 90 86 A 93259.80511230 .00000024 00000-0 16538-4 0 5820
2 20826 82.5244 3.4858 0014279 90.4112 269.8684 13.83557223149953
GPS BII-09
1 20830U 90 88 A 93254.42214579 .00000001 00000-0 99999-4 0 5755
2 20830 55.2560 91.4721 0066889 109.0017 251.8647 2.00557344 21834
GPS BII-10
1 20959U 90103 A 93252.83995386 .00000014 00000-0 99999-4 0 4540
2 20959 54.9413 151.0967 0074212 223.0438 136.4278 2.00555067 20395
DMSP B5D2-5
1 20978U 90105 A 93257.37898469 .00000143 00000-0 59308-4 0 1215
2 20978 98.7274 314.8996 0078468 255.6598 103.5869 14.32288325145626
Glonass 47
1 21006U 90110 A 93259.60683036 .00000015 00000-0 00000+0 0 3731
2 21006 64.8979 118.5831 0059927 186.0035 174.0247 2.13102144 21619
Glonass 48
1 21007U 90110 B 93259.79074280 .00000015 00000-0 00000+0 0 3917
2 21007 64.9185 118.6359 0037321 178.0740 182.0399 2.13101127 21611
Glonass 49
1 21008U 90110 C 93259.20707427 .00000015 00000-0 00000+0 0 3909
2 21008 64.8984 118.6167 0007934 281.3314 78.6745 2.13099315 21606
INFORMTR-1
1 21087U 91 6 A 93258.82210440 .00000085 00000-0 82656-4 0 8513
2 21087 82.9462 345.7517 0036538 127.3942 233.0529 13.74524611131896
Cosmos 2123
1 21089U 91 7 A 93258.92727265 .00000015 00000-0 97845-5 0 4229
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2 21089 82.9209 214.8155 0029014 149.1348 211.1521 13.74026337130984
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2 21140 0.1967 6.7223 0001435 169.9979 68.3621 1.00272091 4200
Nadezhda 3
1 21152U 91 19 A 93259.81973096 .00000026 00000-0 21203-4 0 5156
2 21152 82.9267 169.6787 0040632 257.3915 102.2695 13.73486215125865
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1 21216U 91 25 A 93255.40137452 -.00000022 00000-0 99999-4 0 613
2 21216 65.0683 358.2768 0010842 208.1623 151.8085 2.13103694 19027
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1 21217U 91 25 B 93259.21927280 -.00000022 00000-0 00000+0 0 3357
2 21217 65.0857 358.1565 0011737 230.0740 129.8539 2.13101886 19102
Glonass 52
1 21218U 91 25 C 93238.68737468 -.00000022 00000-0 99999-4 0 9472
2 21218 65.0605 358.8466 0007509 297.9123 62.0168 2.13102447 18660
GRO
1 21225U 91 27 B 93259.62659304 .00030305 00000-0 17973-3 0 9917
2 21225 28.4612 348.9177 0004286 281.0632 78.9543 15.76479502 14544
Meteor 3-4
1 21232U 91 30 A 93256.82905783 .00000043 00000-0 99999-4 0 4014
2 21232 82.5445 4.9697 0013624 151.6360 208.5507 13.16454961114994
NOAA 12
1 21263U 91 32 A 93259.62098399 .00000128 00000-0 65870-4 0 6687
2 21263 98.6511 288.0337 0012596 313.6703 46.3448 14.22310141121645
OKEAN 3
1 21397U 91 39 A 93258.21084529 .00000307 00000-0 42740-4 0 7698
2 21397 82.5260 351.2091 0024539 74.9542 285.4404 14.76020753122942
GPS BII-11
1 21552U 91 47 A 93254.60614821 -.00000000 00000-0 99999-4 0 4172
2 21552 55.5962 88.9612 0047978 230.0161 129.6379 2.00550001 16020
ERS-1
1 21574U 91 50 A 93258.81349917 .00000207 00000-0 84167-4 0 9475
2 21574 98.5546 332.3085 0002387 88.8629 271.2794 14.32249645113381
UO-22
1 21575U 91 50 B 93258.21651950 .00000056 00000-0 25939-4 0 2751
2 21575 98.4663 332.8513 0008598 35.8209 324.3553 14.36850048113593
ORBCOMM-X
1 21576U 91 50 C 93259.22034092 .00000060 00000-0 27387-4 0 3931
2 21576 98.4658 332.9693 0004799 41.7462 318.4089 14.36233748113684
TUBSAT
1 21577U 91 50 D 93257.60037237 .00000032 00000-0 17922-4 0 2804
2 21577 98.4661 331.7552 0007433 37.2646 322.9058 14.36392755113479
SARA
1 21578U 91 50 E 93258.59342439 .00000284 00000-0 99857-4 0 4490
2 21578 98.4728 334.7455 0005844 39.6078 320.5542 14.38517316113722
TDRS 4
1 21639U 91 54 B 93256.33424068 .00000108 00000-0 00000+0 0 4370
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Meteor 3-5
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1 21655U 91 56 A 93259.22463762 .00000043 00000-0 99999-4 0 4586
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1 21701U 91 63 B 93247.37464806 -.00000772 00000-0 -57565-4 0 2558
2 21701 56.9828 224.1299 0003966 86.4471 273.7082 14.96117854108154
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1 21798U 93258.28006044 .00000111 00000-0 68760-4 0 12929
2 21798 98.9586 258.5486 0012172 194.0691 166.0159 14.13712925 92773
Glonass 53
1 21853U 92 5 A 93242.18542679 .00000015 00000-0 99999-4 0 6528
2 21853 64.8393 118.9088 0006472 202.1198 157.9389 2.13102263 12343
Glonass 54
1 21854U 92 5 B 93258.90247620 .00000015 00000-0 00000+0 0 6704
2 21854 64.8458 118.3293 0016565 18.6469 341.5159 2.13103046 12697
Glonass 55
1 21855U 92 5 C 93258.02394460 .00000015 00000-0 00000+0 0 6646
2 21855 64.8453 118.3674 0006931 195.7204 164.3594 2.13102223 12663
JERS-1
1 21867U 92 7 A 93256.60160537 .00000596 00000-0 51954-4 0 9588
2 21867 97.6688 331.4475 0000668 115.3634 244.7984 14.98670477 86959
GPS BII-12
1 21890U 92 9 A 93252.56702998 -.00000007 00000-0 99999-4 0 2931
2 21890 54.3093 268.2904 0058612 157.8241 202.4722 2.00566275 11359
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2 21930 55.4731 29.0457 0062484 164.1008 196.1122 2.00563042 10299
EUVE
1 21987U 92 31 A 93244.27957931 .00001505 00000-0 68034-4 0 882
2 21987 28.4322 191.0737 0010258 61.4115 298.7511 15.17539591 68454
SAMPEX
1 22012U 92 38 A 93259.05126437 .00001053 00000-0 90817-4 0 2323
2 22012 81.6711 99.6690 0118122 212.2479 147.1482 14.91549678 65455
GPS BII-14
1 22014U 92 39 A 93254.31309462 .00000012 00000-0 99999-4 0 1728
2 22014 54.9362 208.8562 0084263 290.5216 68.5575 2.00576243 2152
Glonass 56
1 22056U 92 47 A 93259.33259903 -.00000022 00000-0 00000+0 0 4897
2 22056 64.9145 358.3902 0005114 255.3897 104.5844 2.13103140 8779
Glonass 57
1 22057U 92 47 B 93258.98048681 -.00000022 00000-0 00000+0 0 5045
2 22057 64.9270 358.4071 0005149 268.8472 91.0982 2.13101877 8760
Glonass 58
1 22058U 92 47 C 93259.15647245 -.00000022 00000-0 00000+0 0 5047
2 22058 64.9242 358.4207 0012250 290.9604 68.9313 2.13102206 8808
TOPEX
1 22076U 92 52 A 93254.77687376 -.00000001 00000-0 99999-4 0 2971
2 22076 66.0413 149.2876 0008082 264.8472 95.1606 12.80930077 50837
KITSAT-A
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2 22077 66.0790 154.7002 0000483 354.1910 5.9105 12.86279206 50250
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2 22078 66.0760 133.4537 0001809 36.5386 323.5755 12.86560717 51594
TOPEX R/B
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2 22079 66.0594 148.1765 0072408 317.5591 41.9836 12.77665068 51214
GPS BII-15
1 22108U 92 58 A 93254.27485606 -.00000007 00000-0 99999-4 0 1919
2 22108 54.5196 268.8802 0103968 131.2615 229.6829 2.00566238 7338
FREJA
1 22161U 92 64 A 93258.50700912 .00000100 00000-0 70170-4 0 1547
2 22161 62.9979 267.3922 0773159 290.8324 61.1586 13.21666241 45498
LAGEOS II
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2 22195 52.6632 268.5760 0137177 356.6563 3.3077 6.47293271 21036
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2 22231 54.5790 210.0269 0045072 297.8643 61.6562 2.00570430 5900
GPS BII-17
1 22275U 92 89 A 93254.59984892 .00000012 00000-0 99999-4 0 1087
2 22275 54.6907 207.6952 0054718 256.9017 102.4812 2.00561078 5324
TDRS 5
1 22314U 93 3 B 93256.36216499 -.00000038 00000-0 99999-4 0 983
2 22314 0.4847 71.0411 0000394 168.0995 124.5797 1.00559737 2559
GPS BII-18
1 22446U 93 7 A 93254.17407907 -.00000030 00000-0 99999-4 0 1080
2 22446 54.8052 328.7058 0065681 335.7766 23.9777 2.00558184 4349
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1 22512U 93 10 A 93259.07912533 .00000015 00000-0 12645-3 0 2443
2 22512 64.8577 118.1749 0008597 189.8596 170.2254 2.13102076 4284
Glonass 60
1 22513U 93 10 B 93259.02002959 .00000015 00000-0 00000+0 0 2359
2 22513 64.8618 118.1853 0007118 186.9039 173.1890 2.13102481 4485
Glonass 61
1 22514U 93 10 C 93259.25511919 .00000015 00000-0 00000+0 0 2244
2 22514 64.8649 118.1753 0013358 185.9871 174.0984 2.13101566 4482
ASTRO-D
1 22521U 93 11 A 93257.55749271 .00082382 00000-0 73123-2 0 466
2 22521 31.1056 6.3093 0077213 280.5979 78.1898 14.92583899 30878
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1 22563U 93 15 A 93254.27726604 .00000008 00000-0 99999-4 0 407
2 22563 27.1329 303.8175 0007929 253.5453 106.4329 0.99251175 21
GPS BII-19
1 22581U 93 17 A 93249.33578500 -.00000025 00000-0 99999-4 0 332
2 22581 54.9784 29.0844 0041039 36.1125 324.1685 2.00557468 3266
ProgressM17
1 22588U 93 19 A 93259.25777749 .00015291 00000-0 15283-3 0 1603
2 22588 51.6222 120.3240 0005699 106.0889 253.9588 15.65803319 26401
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1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
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2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
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2 22657 55.0157 28.6720 0059276 199.3948 160.3926 2.00575828 6037
GPS BII-21
1 22700U 93 42 A 93254.92219425 -.00000007 00000-0 99999-4 0 310
2 22700 54.6988 269.5383 0024456 296.7614 63.0406 2.00568823 1504
Soyuz TM-17
1 22704U 93 43 A 93259.90933742 .00009072 00000-0 11730-3 0 601
2 22704 51.6175 118.6765 0004687 86.7490 273.4201 15.59745800433446
NOAA 13
1 22739U 93256.56836164 -.00000057 00000-0 -21522-4 0 224
2 22739 98.9085 197.5452 0009742 175.0798 185.0527 14.10850787 4953
ProgressM19
1 22745U 93 52 A 93259.90933742 .00009247 00000-0 11943-3 0 325
2 22745 51.6182 118.6760 0004660 95.9641 264.2122 15.59747078 5786
RESURS F-19
1 22777U 93 53 A 93253.15085039 .00082033 00000-0 56066-4 0 419
2 22777 82.5865 142.1979 0004300 256.0056 104.0513 16.16417070 2701
GPS BII-22
1 22779U 93 54 A 93258.01766454 -.00000031 00000-0 -52136+1 0 217
2 22779 54.9076 328.4443 0062116 192.7728 167.1372 2.01761826 325
1993 054B
1 22780U 93 54 B 93260.07260577 .00003520 00000-0 19213-3 0 95
2 22780 22.0434 201.1983 0193783 36.4721 324.8816 14.93736902 2620
1993 054C
1 22781U 93 54 C 93259.36860440 .00070837 12893-4 20577-2 0 356
2 22781 34.8275 310.3660 6034652 209.9649 95.7017 4.06791568 707
Meteor 2-21
1 22782U 93 55 A 93259.09859596 .00000020 00000-0 13099-4 0 137
2 22782 82.5452 63.6357 0021195 275.6959 84.1782 13.82985365 2204
TEMISAT
1 22783U 93 55 B 93259.53131216 .00000021 00000-0 13833-4 0 170
2 22783 82.5456 63.2901 0020808 274.3701 85.5081 13.83096691 2260
1993 055C
1 22784U 93 55 C 93259.24194305 .00000008 00000-0 16766-5 0 148
2 22784 82.5469 63.5193 0020787 274.8194 85.0590 13.83096612 2227
USA 96
1 22787U 93 56 A 93257.40782684 .00000098 00000-0 99999-4 0 159
2 22787 5.0912 322.7483 0190331 186.9422 1.0032 1.00323392 46
1993 056B
1 22788U 93 56 B 93259.46324427 .00040102 00000-0 17800-2 0 154
2 22788 27.0043 317.8842 5261586 198.1483 132.0806 5.27350024 687
Cosmos 2262
1 22789U 93 57 A 93259.95577471 .00234961 12056-4 19237-3 0 253
2 22789 64.8918 189.1976 0077985 58.7343 302.1043 16.07235904 1510
1993 057B
1 22790U 93 57 B 93254.18062844 .24101942 38197-4 17551-3 0 213
2 22790 64.8923 210.0887 0018020 73.4055 287.4961 16.51871081 594
STS 51
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1 22795U 93 58 A 93260.28125000 .01492251 00000-0 32600-2 0 187
2 22795 28.4627 323.6790 0021613 14.5901 241.7797 15.93728795 765
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93259.39719581 -.00000199 00000-0 99999-4 0 50
2 22797 15.4329 355.9805 7473500 1.1660 359.8161 2.01096406 87
1993 058C
1 22798U 93 58 C 93259.54858334 .00102229 00000-0 23811-3 0 42
2 22798 28.4651 329.1947 0026578 6.9610 353.0377 15.94875233 646
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
1993 050C
1 22801U 93 50 C 93257.83998298 .00000770 00000-0 44859-3 0 13
2 22801 98.9084 198.8025 0003435 138.8249 221.3182 14.11069912 5138
1993 059A
1 22802U 93 59 A 93259.66573159 -.00000020 00000-0 00000+0 0 38
2 22802 71.0004 155.2592 0003913 78.4575 281.9125 14.12268502 53
1993 059B
1 22803U 93 59 B 93260.08881546 .00039877 00000-0 20143-1 0 32
2 22803 70.9941 154.3508 0018028 267.5602 92.3450 14.15804243 117
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1 22804U 93 59 C 93259.87817693 -.00000019 00000-0 00000+0 0 35
2 22804 71.4684 155.1780 0433547 118.2888 159.6053 13.69276676 87
1993 059D
1 22805U 93 59 D 93259.89625421 .00047020 00000-0 46508-1 0 42
2 22805 70.9833 154.6232 0216561 94.7919 267.7941 13.68236257 89
1993 059E
1 22806U 93 59 E 93259.89576308 -.00000017 00000-0 00000+0 0 32
2 22806 71.0314 155.1658 0203721 72.3496 292.7052 13.71144356 83
1993 059F
1 22807U 93 59 F 93259.96881725 -.00000017 00000-0 00000+0 0 33
2 22807 71.0283 155.0154 0209632 95.2521 268.2521 13.69855982 90
1993 060A
1 22808U 93 60 A 93260.34420895 -.00000148 00000-0 00000+0 0 32
2 22808 65.0231 40.6568 0011591 276.9966 83.4977 15.52205908 49
1993 060B
1 22809U 93 60 B 93260.27969054 -.00005009 34600-4 00000+0 0 16
2 22809 64.9892 40.7397 0177109 52.5096 355.9348 16.16428268 37
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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204. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 21:59:38 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748303178@afit.af.mil>
Source record: 28611

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

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STS 51
1 22795U 93 58 A 93260.28125000 .01492251 00000-0 32600-2 0 187
2 22795 28.4627 323.6790 0021613 14.5901 241.7797 15.93728795 765
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93259.39719581 -.00000199 00000-0 99999-4 0 50
2 22797 15.4329 355.9805 7473500 1.1660 359.8161 2.01096406 87
1993 058C
1 22798U 93 58 C 93259.54858334 .00102229 00000-0 23811-3 0 42
2 22798 28.4651 329.1947 0026578 6.9610 353.0377 15.94875233 646
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
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205. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-17 21:59:54 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748303194@afit.af.mil>
Source record: 28622
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

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STS 51
1 22795U 93 58 A 93260.28125000 .01492251 00000-0 32600-2 0 187
2 22795 28.4627 323.6790 0021613 14.5901 241.7797 15.93728795 765
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93259.39719581 -.00000199 00000-0 99999-4 0 50
2 22797 15.4329 355.9805 7473500 1.1660 359.8161 2.01096406 87
1993 058C
1 22798U 93 58 C 93259.54858334 .00102229 00000-0 23811-3 0 42
2 22798 28.4651 329.1947 0026578 6.9610 353.0377 15.94875233 646
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

206. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-19 05:26:07 UTC
From: gfbell@uswnvg.com
Message-ID: <9407@uswnvg.uswnvg.com>
Source record: 28612

Look at it this way:
When you get a busy message you have essentially made contact with the MIR TNC. It heard your signal and gave you the busy packet. Why go any farther? Do the cosmonauts like to ragchew?

Greg - NA7P

207. NF3I -- Scott Rosenfeld

Newsgroup: rec.radio.amateur.space
Date: 1993-09-19 18:23:06 UTC
From: aflorenc@news.vt.edu
Message-ID: <aflorenc.9.748462986@news.vt.edu>
Source record: 28613

Attention Scott Rosenfeld, NF3I, in Maryland. Please E-mail me.

Adam Florence
aflorenc@vt.edu

208. ANS-261 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-19 22:19:37 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-261.01@ampr.org>
Source record: 28621
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-261.01
STS-58 SAREX MISSION INFO

HR AMSAT NEWS SERVICE BULLETIN 261.01 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-261.01

KA3HDO Provides STS-58 SAREX Mission Information

The STS-58 flight of the Space Shuttle Columbia represents the next mission carrying the Shuttle Amateur Radio Experiment (SAREX). STS-58 is currently scheduled for launch on 14-OCT-93 at 14:53 UTC. Spacelab Life Sciences-2 is the primary payload on-board STS-58. During the 13 day (extended duration) flight, the astronauts will conduct around-the-clock experiments on themselves and on living organisms carried in the spacelab module.

The SAREX operations on this flight include voice and packet. Discussions between the astronauts and the SAREX working group indicates that there will be more general contact operations on this flight than was performed on each of the three SAREX flight flown this year. Please remember that this is a preflight prediction. The astronauts and the SAREX working group cannot guarantee this prediction. The following information gives more details on SAREX operations for STS-58.

STS-58 Shuttle Amateur Radio Experiment (SAREX)
Information Sheet

Mission: STS-58 Space Shuttle Columbia
Spacelab Life Sciences-2 (SLS-2) Mission

Launch: October 14, 1993, 14:53 UTC

Orbit: 39 degrees orbital inclination

Mission Length: 13 days (Nominal)

Amateur
Radio
Operators: Bill McArthur (KC5ACR), Marty Fettman (KC5AXA),
Rick Searfoss, Callsign TBD

Modes: FM Voice
Prime callsign KC5ACR

Packet Radio
Callsign W5RRR-1

Frequencies: All operations in split mode. Do not transmit on
the downlink frequency.

Voice Freqs: Downlink: 145.55 MHz (Worldwide)
Uplinks: 144.91, 144.93, 144.95, 144.97, 144.99 MHz
(Except Europe)
144.70, 144.75, 144.80 MHz (Europe only)

Note: the crew will not favor any specific uplink
frequency, so your ability to work the crew will
be the "luck of the draw."

Packet Freqs: Downlink: 145.55 MHz
Uplink: 144.49 MHz

Info: Goddard Amateur Radio Club, WA3NAN, Greenbelt Maryland,
SAREX Bulletins and Shuttle Retransmissions
3.860 MHz, 7.185 MHz, 14.295 MHz, 21.395 MHz, 28.650 MHz
and 147.450 MHz (FM)

Johnson Space Center ARC, W5RRR, Houston, Texas
SAREX Bulletins 7.225 MHz, 14.280 MHz, 21.395 MHz,
28.650 MHz, (SSB) and 146.64 MHz (FM)

ARRL Amateur Radio Station, W1AW, Newington, CT
SAREX News Bulletins
3.990, 7.290, 14.290, 18.160, 21.390, and 28.590 MHz
and 147.555 MHz (FM)

Also, bulletins available on internet, via AMSAT ANS,
Compuserve, and your local PBSS.

School Group Participation: 18 school groups will participate
in SAREX with pre-scheduled direct
and telebridge contacts. These include
17 in the U.S., and one France.

Prelaunch Keplerian Elements:

The following Keplerian Elements are provided by Gil Carman (WA5NOM)
at the Johnson Space Center ARC:

STS-58
1 00058U 93287.67747791 .00119475 00000-0 26040-3 0 50
2 00058 39.0114 124.6663 0007676 272.4217 87.5676 15.96123499 22

Satellite: STS-58
Catalog number: 00058
Epoch time: 93287.67747791 = (14-OCT-93 16:15:34.09 UTC)
Element set: 005
Inclination: 39.0114 deg
RA of node: 124.6663 deg Space Shuttle Flight STS-58
Eccentricity: .0007676 Prelaunch Element set JSC-005
Arg of perigee: 272.4217 deg Launch: 14-OCT-93 14:53 UTC
Mean anomaly: 87.5676 deg

Mean motion: 15.96123499 rev/day Gil Carman, WA5NOM
Decay rate: 1.19475e-03 rev/day*2 NASA Johnson Space Center
Epoch rev: 2
Checksum: 329

[The AMSAT News Service (ANS) would like to thank Frank Bauer (KA3HDO) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-261.02
AMSAT-CE information

HR AMSAT NEWS SERVICE BULLETIN 261.02 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-261.02

AMSAT Chile Information

The Foundation for the Development of Satellites for Radio Amateurs (Fundacion de Desarrollo de Satelites de Aficionados a las Radio-omunicaciones) or AMSAT-CE was a foundation created by the Chilean Federation of Radio Amateurs Clubs on 23-APR-1992.
Its objectives are scientific and technological in nature and are expected to be realized in the design, construction, launch and operation of amateur radio experimental satellites, in the transfer of technology and in other experiments related to space communications.

AMSAT-CE is a non profit amateur organization which is directed by a Council composed of nine members, all of them licensed radio amateurs: CE2MH Ignacio, President; CE3LD Italo, Vicepresident; CE3AFC Axel, Secretary; CE2HI Carlos, Treasurer; and CE3MVK Victor, CE3GA Eduardo, CE3EOA Patricio, CE3AYS Mario and CE5NG Klaus, Counselors.

Its first project CESAR-1 will be implemented using the new AMSAT-NA satellite bus concept known as "MICROSAT." An agreement for joint cooper-ation between AMSAT-NA and AMSAT-CE was signed on January 20, 1993.

For those interested in finding out more about AMSAT-CE, the address of AMSAT-CE is:

Avda. Portales 4040, Casa 439
P. O. Box 40 Correo 5 Santiago
Telephone 56 - 2 - 773 7831
E-mail amsat-ce@cecux1.cec.uchile.cl
Quinta Normal, Santiago, Chile

[The AMSAT News Service (ANS) would like to thank Ignacio Martinez (CE2MH) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-261.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 261.03 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-261.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

2-Oct-93 1400 B 160 WA5ZIB WJ9F
9-Oct-93 1500 B 101 W9ODI N7NQM
23-Oct-93 1315 B 154 WB6LLO WA5ZIB

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-261.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 261.04 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-261.04

Weekly OSCAR Status Reports: 18-SEP-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 16-Oct 25
Mode-B : MA 0 to MA 60 !
Mode-BS : MA 60 to MA 120 !<- after Aug 30 (hopefully)
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Alon/Alat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, 25-Oct-93
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these

bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-13 DX: To let all interested parties know, Pino (I0DUD), Antonio (I0JX) and WB6GYD will be conducting AO-13 Mode-B operations from the Vatican on Saturday, 25-SEPT-93 starting approximately 05:00 UTC and again on Sunday, 26-SEP-930. The call sign will be announced at that time and a QSL route will be established. This operation was previously announced in Oscar Satellite Report. In addition, they plan to spend Friday night (probably 20:00 until 05:00 UTC Sept 24-25 at the Vatican and operate on 20/30/40 meters. All are invited look for them and make a DX contact. [WB6GYD]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: Operating normally. [WH6I]

MIR: WD8LAQ reports that he heard R0MIR on voice and that stations who wish to also work MIR should understand that the MIR crew is working under Moscow time, which is four hours ahead of UTC. This means that their "free" pre-sleep time (about 12 Noon until 2 P.M. EDT) is a prime window of opportunity for them to be "playing" ham radio during the week. Under normal circumstances, WD8LAQ understands that the MIR crew gets all day Sunday off. WD8LAQ called R0MIR while at hamfest on 145.550 MHz FM voice not expecting much at about 2 P.M. After a couple calls R0MIR came booming in at a signal strength of 20 over S9! Some onlookers could not believe it was really one of the MIR crew because of the strong signal. WD8LAQ is sure they heard him but it sounded like R0MIR was in QSO with someone else. R0MIR said to look for him on the next pass.

ARSENE: ARSENE satellite is no longer responding to telecommands sent by FF1STA station at ENSAE School in Toulouse. Numerous commands have been sent to try to reactivate the satellite without success. It has been since 09-SEP-93 around 00:00 UTC that the last ARSENE signals were heard in Mode-S and FF1STA has not receive any more telemetry from the satellite. The transmissions stopped at the moment ARSENE was coming out of a one hour eclipse period. Contrasting this with before, the SHF power stage temperature never reached more than 42 degrees Celsius before entering into the Earth shadow. The temperature dropped by ten degrees when in the eclipse part of the orbit. FF1STA command station was able to observe telemetry data indicating that automatic system for eclipse power conditions was working fine. All collected telemetry data before the failure is carefully being investigated by ARSENE experts. There will be one last effort to recover ARSENE in the coming week using the FC1ELL EME station in Argenteuil, France near Paris with an 8M dish and high power UHF transmitter. [F6BVP]

RS-12: KB0J was still able to make an "over-the-horizon" DX contact with HK1LAQ on 29.427 MHz and also CY9R on 29.423. The later station was on a "DX-pedition" to ST. Paul Island. Please remember that the uplink for RS-12 is on 15M and the downlink is 10M. [K0BJ]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX
SB SAT @ AMSAT $ANS-261.05
IT ON QRZ CD ROM

HR AMSAT NEWS SERVICE BULLETIN 261.05 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-261.05

INTANTTRACK Showing Up On QRZ CD ROM

It has come to attention of AMSAT that InstantTrack has been appearing on a CD ROM called QRZ. Some have asked if IT has become shareware. It is emphasised that InstantTrack is not, nor has it ever been shareware. The popular tracking program is the creation of Franklin Antonio who has very kindly offered it to AMSAT as a fund raiseing tool. However, Franklin retains the copyright. Whatever steps have been or are being taken in response to this copyright violation are in his hands.

Franklin has requested that anyone who has bought a QRZ CD ROM containing InstantTrack to please provide him with the following information:

1. Your name and address.

2. Where, when it was purchased. If you purchased the disk in a store, the name and address of the store would be helpful. If you don't know the address, name of store and city is acceptable.

3. A statement that your copy of QRZ CD-ROM does contain InstantTrack. (Look in misc/dl_files/it_track.exe, though it might be elsewhere in different versions of the CD-ROM.)

4. Version #, or date appearing on face of QRZ CD-ROM. (or just xerox the front of the CD-ROM for identification.)

Please address corespondance to:

Franklin Antonio
2765 Cordoba Cove
Del Mar, CA 92014.

Email may also be used but a written letter is preferrd in situations such as this. The email address is: antonio@qualcomm.com.

/EX

209. APT-Satellites: Report SEP 19, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-09-20 07:14:12 UTC
From: peter.henne@gmd.de
Message-ID: <1993Sep20.071412.23145@gmd.de>
Source record: 28614
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, SEP 19, 1993

NOAA-9: APT 137.62 *OFF*
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.40 On
Meteor 3-3: APT 137.85 On
Meteor 3-4: APT 137.30 *OFF*

Meteor 2-21 transmits vis-APT on 137.40 MHz. Signal is weak,
but slightly better than one or two weeks ago.
NOAA-9 APT and BCN are off due to VHF-Conflict with NOAA-11.
```


```
+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

210. New York freq. for NASA Select

Newsgroup: rec.radio.amateur.space
Date: 1993-09-20 14:27:38 UTC
From: mac20@namaste.cc.columbia.edu
Message-ID: <27kekq$m3v@apakabar.cc.columbia.edu>
Source record: 28615

Can someone please tell me a 2 meter or 440 freq to listen to the
shuttle rebroadcasts on in the metropolitan area?
Guess it made it's way out of my memories :-)

Mike
KF2NV

211. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-20 21:37:45 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748561065@afit.af.mil>
Source record: 28616

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93262.65623842 .00041829 00000-0 92822-4 0 237
2 22795 28.4601 305.8033 0028883 50.7623 193.1069 15.95637199 1142
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93262.38076634 -.00000176 00000-0 99999-4 0 64
2 22797 15.4980 354.7796 7472023 3.1813 359.7684 2.01097091 144
1993 058C
1 22798U 93 58 C 93261.23789772 .00040526 00000-0 94449-4 0 69
2 22798 28.4573 316.4798 0024866 35.9738 324.8584 15.94957439 918
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

212. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-20 21:38:03 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748561083@afit.af.mil>
Source record: 28623
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93262.65623842 .00041829 00000-0 92822-4 0 237
2 22795 28.4601 305.8033 0028883 50.7623 193.1069 15.95637199 1142
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93262.38076634 -.00000176 00000-0 99999-4 0 64
2 22797 15.4980 354.7796 7472023 3.1813 359.7684 2.01097091 144
1993 058C
1 22798U 93 58 C 93261.23789772 .00040526 00000-0 94449-4 0 69
2 22798 28.4573 316.4798 0024866 35.9738 324.8584 15.94957439 918
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

213. FO-20 equipment

Newsgroup: rec.radio.amateur.space
Date: 1993-09-21 00:49:01 UTC
From: greg@core.rose.hp.com
Message-ID: <CDoI9p.ACA@icon.rose.hp.com>
Source record: 28617

Hi, folks,

Since FO-20 is supposedly running mode JA (SSB 2m/70cm) on Wednesdays, I thought I'd listen to see if it would be a less crowded alternative to RS-10. I found the packet/telemetry/general-buzzing-noise signal on 70cm, just above the SSB bandpass (435.910-ish), but nothing down in the SSB range (435.800 - 435.900, right?).

Is this virgin bandwidth, or am I not doing something right?

If it is, what sort of uplink power will I need? I'm margially into RS-10 with 10 watts and a J-pole. It's orbit isn't that much higher than RS-10's, so I'm hoping the lack of a crowd will compensate.

Thanks,

Greg. KD6KGW

214. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-21 20:08:56 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748642136@afit.af.mil>
Source record: 28624

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93263.91666666 .00041816 00000-0 93177-4 0 250
2 22795 28.4645 296.3058 0028426 63.9330 235.7131 15.95588560 1347
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93263.37516873 -.00000166 00000-0 99999-4 0 78
2 22797 15.4978 354.4791 7472150 3.7872 359.6557 2.01096764 161
1993 058C
1 22798U 93 58 C 93261.23789772 .00040526 00000-0 94449-4 0 69
2 22798 28.4573 316.4798 0024866 35.9738 324.8584 15.94957439 918
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

215. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-09-21 20:09:15 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748642155@afit.af.mil>
Source record: 28626
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
STS 51
1 22795U 93 58 A 93263.91666666 .00041816 00000-0 93177-4 0 250
2 22795 28.4645 296.3058 0028426 63.9330 235.7131 15.95588560 1347
1993 058B
1 22796U 93 58 B 93260.13541666 -.00000021 00000-0 99999-4 0 98
2 22796 0.2930 198.9000 0150000 122.1100 5.7000 0.98999999 27
1993 058D
1 22797U 93 58 D 93263.37516873 -.00000166 00000-0 99999-4 0 78
2 22797 15.4978 354.4791 7472150 3.7872 359.6557 2.01096764 161
1993 058C
1 22798U 93 58 C 93261.23789772 .00040526 00000-0 94449-4 0 69
2 22798 28.4573 316.4798 0024866 35.9738 324.8584 15.94957439 918
1993 058E
1 22799U 93 58 E 93258.54732251 .00066415 00000-0 87570-4 0 51
2 22799 28.4693 336.5981 0027182 186.7528 206.9421 16.04512373 483
1993 058F
1 22800U 93 58 F 93258.54329956 .00068451 00000-0 90668-4 0 30
2 22800 28.3842 336.5980 0096042 155.6091 207.5980 15.96608222 487
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

216. ARRL wants info on Amateur Radio activity above 900 MHz

Newsgroup: rec.radio.amateur.space
Date: 1993-09-21 21:04:06 UTC
From: ehare@arrl.org
Message-ID: <2284@arrl.org>
Source record: 28625
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.space,rec.radio.amateur.digital.misc

I have been asked to document Amateur Radio activity in the upper UHF
and microwave bands. I would like to ask our newsgroup readers to
email me information about their equipment and activities on Amateur
frequencies starting with the 902 MHz band.

I would like few levels of responses:

1. A fast report on your equipment and activities. This can include
digital modes, satellite, ATV, etc.

2. Immediate comments about your thoughts on the use of these
frequencies, our future, the direction we are headed, the relative
importance of the different modes (no CW wars, PLEASE!). This can
include summaries of the things you are planning to do (or would
like to do) when you get around to it, or a soapbox of the
way you think things should be.

I will forward this information to several different people here on
staff, for long-term use in our work before the FCC. Out of 45K
readers, I should be able to get quite a few reports. Thanks to all
who respond.

73 from ARRL HQ, Ed
N

Ed Hare, KA1CV ehare@arrl.org
American Radio Relay League
225 Main St.
Newington, CT 06111 "You will never put the puzzle together
(203) 666-1541 - voice if you keep putting all of the pieces
ARRL Laboratory Supervisor back in the box." Colleen
RFI, xmtr and rcvr testing
-----

217. Re: Can I use MIR as a digipeater?

Newsgroup: rec.radio.amateur.space
Date: 1993-09-23 00:14:10 UTC
From: davidar@microsoft.com
Message-ID: <1993Sep23.001410.23348@microsoft.com>
Source record: 28627

In article <275fvrINNngc@network.ucsd.edu> brian@nothing.ucsd.edu (Brian Kantor) writes:
>
>On the other hand, if you get a busy disconnect, that's an established
>two-way contact - you sent a SABM, they replied with a DM. That's all
>you need to log it if you're just proving you could do it.
> - Brian

A QSL card from MIR is what I want. Or, if possible, I want to digipeat
through MIR and have a brief QSO with a DX ground station.

Dave

218. * SpaceNews 27-Sep-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 15:46:52 UTC
From: John Magliacane <kd2bd@ka2qhd.ocpt.ccur.com>
Message-ID: <$spc0927@ampr.org>
Source record: 28632
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC0927
* SpaceNews 27-Sep-93 *

BID: $SPC0927

=========
SpaceNews
=========

MONDAY SEPTEMBER 27, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* ARSENE FAILURE *
==================
The ARSENE satellite is no longer responding to telecommands sent by the FF1STA command station at ENSAE School in Toulouse. Numerous commands have been sent to try to reactivate the satellite without success. Since September 9th at around 00:00 UTC when ARSENE signal was last heard in mode S, controllers have not received any more telemetry from the satellite. The transmission stopped at the moment ARSENE was moving out of a one hour eclipse period. Contrasting with was earlier thought, the SHF power output stage temperature never reached more than 42 degrees Celsius before entering into the Earth shadow. The temperature dropped by ten degrees when in the eclipse part of the orbit. The FF1STA command station was able to observe telemetry data indicating that the automatic system for handling eclipse power conditions was working fine. All collected telemetry data before the failure is carefully being investigated by ARSENE experts. There will be an attempt made to recover ARSENE using the FC1ELL EME station in Argenteuil near Paris, with an 8m dish and high power UHF transmitter.

[Info via Bernard, F6BVP]

* OSCAR-11 FAILURE *
====================
Controllers at the UoSAT Control Centre at the University of Surrey are requesting the help of the amateur radio community around the world in collecting information and data from UoSAT-OSCAR-11. The Forth Diary Operating system aboard UO-11 has crashed. This has rendered the spacecraft in a non-nominal operating state. The collection of information and data related to the operational condition of the spacecraft will be essential in helping the controllers to understand the spacecraft's current condition. Therefore the UoSAT command team is asking radio amateurs around the world to monitor the spacecraft and relay any reception reports and or telemetry

data collected from the spacecraft to them via G0SYX @ UO-22, G0SYX @ KO-23 or via the Internet address: D.Loughmiller@ee.surrey.ac.uk.

UoSAT-OSCAR-11 operates on a 2M frequency of 145.826 MHz and on a 70 cm frequency of 435.027 MHz. Controllers are most interested in which beacon is active at the time of any given observation and whether the signal contains data or not. Any telemetry data collected would be of particular interest to the controllers as well. Any observations provided by the amateur community will be most appreciated. UoSAT controllers will issue subsequent bulletins about the status of the UoSAT-OSCAR-11 spacecraft as the situation develops.

[Info via KO5I/G0SYX and the AMSAT News Service]

* VE2ONT MOONBOUNCE TEST *
==========
All appears ready for the upcoming EME tests by The Toronto VHF Society, using the callsign VE3ONT. We will use the 46-m (150') diameter radio telescope at Algonquin Provincial Park (grid FN05xw) during this year's A.R.R.L. International EME Competition.

VE3ONT will be active the full weekend of each contest period, October 9/10 and November 6/7, 1993. Below is the schedule of operations:

Date VE3ONT TX Freq. Listening range Approx. times (UTC)

Oct 9 432.050 MHz 432.050 - 432.060 MHz 0445-1830
Oct 10 144.029 MHz 144.025 - 144.030 MHz 0550-1900
Nov 6 432.050 MHz 432.050 - 432.060 MHz 0340 1700
Nov 7 1296.050 MHz 1296.050 - 1296.060 MHz 0450-1730

VE3ONT will operate "split" and we ask that stations avoid calling us on our transmit frequency. VE3ONT will transmit and receive with left-hand circular-polarization (LHCP) off the dish on all bands. This means that after reflection from the Moon, signals will be right-hand circular polarized (RHCP). This will permit us to work stations with vertical, horizontal, or RHCP polarization. VE3ONT will transmit at the legal power limit on 144 and 432 MHz and 100 watts on 1296. Power amplifiers and receiving preamps are located at the dish feed.

As users of a non-amateur antenna, we will not be in competition with other stations. Our intention is to provide an initial EME contact for as many stations as possible. Consequently, we strongly discourage duplicate or "insurance" contacts. Operation will be primarily on CW, although SSB might be employed depending on signal strength and number of stations calling.

All operation will be "random" format, meaning that VE3ONT will accept no skeds. If conditions are poor, we will use a 30-second sequence in which VE3ONT transmits the first 30 seconds and listens during the second 30 seconds of each minute. Note that this is NOT the usual sequence for EME skeds.

VE3ONT will maintain HF liaison on 14.345 MHz during daylight hours and on 3.818 MHz at night.

We anticipate being able to work OSCAR-class stations with 100 watts of output power on 144 and 432 MHz; 25 watts should be sufficient on 1296. A photograph of the dish is shown in the "Up Front in QST" section of the October issue; see also "The World Above 50 MHz" in the same issue. Technical information concerning the dish and VE3ONT's operation was presented by W9IP and VE3ASO at the Central States VHF Conference and the Eastern VHF/UHF Conference.

For clarification, contact Dennis Mungham VE3ASO (613) 998-7330/989-2339 or Michael Owen W9IP (315) 379-0161/379-5975. QSL to VE3ONT (Callbook address).

[Info via Michael Owen, W9IP]

* THANKS! *
===========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

K6CGW AL7KD KB8KBI Roy Stai Paul Milsom

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

219. ORBS$268.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 16:45:47 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-268.o@ampr.org>
Source record: 28628
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-268.O
Orbital Elements 268.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX September 25, 1993
BID: $ORBS-268.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93261.37176135
Element set: 35
Inclination: 27.1985 deg
RA of node: 5.5050 deg
Eccentricity: 0.6025636
Arg of perigee: 115.1006 deg
Mean anomaly: 317.3712 deg
Mean motion: 2.05882714 rev/day
Decay rate: -9.9e-07 rev/day^2
Epoch rev: 7718
Checksum: 283

Satellite: UO-11
Catalog number: 14781
Epoch time: 93266.58557116
Element set: 440
Inclination: 97.8054 deg
RA of node: 288.6093 deg
Eccentricity: 0.0013031
Arg of perigee: 44.3925 deg
Mean anomaly: 315.8324 deg
Mean motion: 14.69056049 rev/day
Decay rate: 1.57e-06 rev/day^2
Epoch rev: 51116
Checksum: 306

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93265.78298818
Element set: 650
Inclination: 82.9282 deg
RA of node: 166.4889 deg
Eccentricity: 0.0013289
Arg of perigee: 49.2382 deg
```

Mean anomaly: 310.9897 deg
Mean motion: 13.72323480 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 31323
Checksum: 344

Satellite: AO-13
Catalog number: 19216
Epoch time: 93263.37003204
Element set: 643
Inclination: 57.8512 deg
RA of node: 293.7059 deg
Eccentricity: 0.7210437
Arg of perigee: 324.5886 deg
Mean anomaly: 4.2495 deg
Mean motion: 2.09718161 rev/day
Decay rate: 1.21e-06 rev/day^2
Epoch rev: 4035
Checksum: 286

Satellite: FO-20
Catalog number: 20480
Epoch time: 93262.12161713
Element set: 456
Inclination: 99.0281 deg
RA of node: 100.4732 deg
Eccentricity: 0.0540198
Arg of perigee: 233.7673 deg
Mean anomaly: 121.2342 deg
Mean motion: 12.83221116 rev/day
Decay rate: -1.0e-07 rev/day^2
Epoch rev: 16936
Checksum: 259

Satellite: AO-21
Catalog number: 21087
Epoch time: 93266.75660614
Element set: 855
Inclination: 82.9460 deg
RA of node: 339.8817 deg
Eccentricity: 0.0036869
Arg of perigee: 106.0838 deg
Mean anomaly: 254.4375 deg
Mean motion: 13.74525023 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 13298
Checksum: 334

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93265.77234864

Element set: 424
Inclination: 82.9210 deg
RA of node: 209.7390 deg
Eccentricity: 0.0029281
Arg of perigee: 130.1855 deg
Mean anomaly: 230.1875 deg
Mean motion: 13.74026602 rev/day
Decay rate: 1.6e-07 rev/day^2
Epoch rev: 13192
Checksum: 291

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93241.80475365
Element set: 21
Inclination: 1.3018 deg
RA of node: 119.8566 deg
Eccentricity: 0.2933615
Arg of perigee: 152.1382 deg
Mean anomaly: 232.4293 deg
Mean motion: 1.42202460 rev/day
Decay rate: -4.9e-07 rev/day^2
Epoch rev: 162
Checksum: 258

/EX
SB KEPS @ AMSAT $ORBS-268.D
Orbital Elements 268.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX September 25, 1993
BID: $ORBS-268.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93265.76629184
Element set: 773
Inclination: 98.6094 deg
RA of node: 348.9428 deg
Eccentricity: 0.0010156
Arg of perigee: 256.6456 deg
Mean anomaly: 103.3594 deg
Mean motion: 14.29792387 rev/day
Decay rate: 4.2e-07 rev/day^2
Epoch rev: 19137
Checksum: 342

Satellite: AO-16
Catalog number: 20439
Epoch time: 93266.18221471
Element set: 578

Inclination: 98.6174 deg
RA of node: 350.3244 deg
Eccentricity: 0.0010459
Arg of perigee: 256.7891 deg
Mean anomaly: 103.2140 deg
Mean motion: 14.29850520 rev/day
Decay rate: 3.4e-07 rev/day^2
Epoch rev: 19144
Checksum: 294

Satellite: DO-17
Catalog number: 20440
Epoch time: 93266.23231091
Element set: 580
Inclination: 98.6178 deg
RA of node: 350.6125 deg
Eccentricity: 0.0010553
Arg of perigee: 255.7561 deg
Mean anomaly: 104.2451 deg
Mean motion: 14.29987128 rev/day
Decay rate: 3.9e-07 rev/day^2
Epoch rev: 19146
Checksum: 296

Satellite: WO-18
Catalog number: 20441
Epoch time: 93266.20321397
Element set: 582
Inclination: 98.6176 deg
RA of node: 350.6033 deg
Eccentricity: 0.0011285
Arg of perigee: 257.3247 deg
Mean anomaly: 102.6691 deg
Mean motion: 14.29965946 rev/day
Decay rate: 3.4e-07 rev/day^2
Epoch rev: 19146
Checksum: 311

Satellite: LO-19
Catalog number: 20442
Epoch time: 93266.75863415
Element set: 579
Inclination: 98.6182 deg
RA of node: 351.3494 deg
Eccentricity: 0.0011457
Arg of perigee: 254.5061 deg
Mean anomaly: 105.4856 deg
Mean motion: 14.30057190 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 19155
Checksum: 308

Satellite: UO-22
Catalog number: 21575
Epoch time: 93265.11055625
Element set: 277
Inclination: 98.4659 deg
RA of node: 339.6293 deg
Eccentricity: 0.0008256
Arg of perigee: 16.3205 deg
Mean anomaly: 343.8248 deg
Mean motion: 14.36851117 rev/day
Decay rate: 5.3e-07 rev/day^2
Epoch rev: 11458
Checksum: 311

Satellite: KO-23
Catalog number: 22077
Epoch time: 93263.67655469
Element set: 115
Inclination: 66.0792 deg
RA of node: 124.2611 deg
Eccentricity: 0.0001255
Arg of perigee: 353.3278 deg
Mean anomaly: 6.7724 deg
Mean motion: 12.86279630 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5212
Checksum: 275

/EX
SB KEPS @ AMSAT $ORBS-268.W
Orbital Elements 268.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX September 25, 1993
BID: $ORBS-268.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93267.03377154
Element set: 464
Inclination: 99.0906 deg
RA of node: 308.8762 deg
Eccentricity: 0.0014261
Arg of perigee: 250.2565 deg
Mean anomaly: 109.7076 deg
Mean motion: 14.13547200 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 45274
Checksum: 308

Satellite: NOAA-10
Catalog number: 16969

Epoch time: 93267.01531806
Element set: 307
Inclination: 98.5164 deg
RA of node: 279.0966 deg
Eccentricity: 0.0014086
Arg of perigee: 29.6511 deg
Mean anomaly: 330.5470 deg
Mean motion: 14.24832292 rev/day
Decay rate: 3.5e-07 rev/day^2
Epoch rev: 36470
Checksum: 306

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93266.81506369
Element set: 217
Inclination: 99.1431 deg
RA of node: 244.6172 deg
Eccentricity: 0.0011659
Arg of perigee: 157.7475 deg
Mean anomaly: 202.4215 deg
Mean motion: 14.12917911 rev/day
Decay rate: 1.44e-06 rev/day^2
Epoch rev: 25760
Checksum: 297

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93266.57019314
Element set: 737
Inclination: 82.5486 deg
RA of node: 95.4701 deg
Eccentricity: 0.0014877
Arg of perigee: 232.6549 deg
Mean anomaly: 127.3218 deg
Mean motion: 13.16023368 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18804
Checksum: 302

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93266.93605468
Element set: 631
Inclination: 98.8542 deg
RA of node: 290.3499 deg
Eccentricity: 0.0016188
Arg of perigee: 37.5863 deg
Mean anomaly: 322.6431 deg
Mean motion: 14.01296183 rev/day
Decay rate: 1.18e-06 rev/day^2

Epoch rev: 15641
Checksum: 326

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93266.38605979
Element set: 584
Inclination: 82.5250 deg
RA of node: 358.2521 deg
Eccentricity: 0.0014777
Arg of perigee: 74.1263 deg
Mean anomaly: 286.1527 deg
Mean motion: 13.83557857 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 15086
Checksum: 326

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93266.32926582
Element set: 404
Inclination: 82.5455 deg
RA of node: 358.2589 deg
Eccentricity: 0.0013970
Arg of perigee: 127.8840 deg
Mean anomaly: 232.3548 deg
Mean motion: 13.16455849 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11624
Checksum: 312

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93266.65576590
Element set: 672
Inclination: 98.6502 deg
RA of node: 294.9367 deg
Eccentricity: 0.0012332
Arg of perigee: 292.0905 deg
Mean anomaly: 67.8960 deg
Mean motion: 14.22312492 rev/day
Decay rate: 1.32e-06 rev/day^2
Epoch rev: 12264
Checksum: 306

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93265.30307878
Element set: 460
Inclination: 82.5525 deg
RA of node: 305.9270 deg

Eccentricity: 0.0013492
Arg of perigee: 140.9697 deg
Mean anomaly: 219.2402 deg
Mean motion: 13.16823738 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10120
Checksum: 290

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93265.46522455
Element set: 15
Inclination: 82.5455 deg
RA of node: 58.5871 deg
Eccentricity: 0.0020982
Arg of perigee: 256.6669 deg
Mean anomaly: 103.2151 deg
Mean motion: 13.82985519 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 308
Checksum: 306

/EX
SB KEPS @ AMSAT $ORBS-268.M
Orbital Elements 268.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX September 25, 1993
BID: $ORBS-268.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93266.82873996
Element set: 312
Inclination: 51.6187 deg
RA of node: 83.8687 deg
Eccentricity: 0.0004427
Arg of perigee: 121.5263 deg
Mean anomaly: 238.6130 deg
Mean motion: 15.59836341 rev/day
Decay rate: 7.872e-05 rev/day^2
Epoch rev: 43452
Checksum: 329

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93266.83838231
Element set: 185
Inclination: 28.4696 deg
RA of node: 148.4226 deg
Eccentricity: 0.0004359

```
Arg of perigee: 3.4825 deg
Mean anomaly: 356.5832 deg
Mean motion: 14.92836713 rev/day
Decay rate: 6.37e-06 rev/day^2
Epoch rev: 18627
Checksum: 321

Satellite: GRO
Catalog number: 21225
Epoch time: 93264.43702394
Element set: 995
Inclination: 28.4646 deg
RA of node: 313.6871 deg
Eccentricity: 0.0006116
Arg of perigee: 328.7533 deg
Mean anomaly: 31.2722 deg
Mean motion: 15.76703769 rev/day
Decay rate: 2.5569e-04 rev/day^2
Epoch rev: 1530
Checksum: 306

Satellite: UARS
Catalog number: 21701
Epoch time: 93265.74981556
Element set: 256
Inclination: 56.9838 deg
RA of node: 150.5436 deg
Eccentricity: 0.0004504
Arg of perigee: 78.1255 deg
Mean anomaly: 282.0293 deg
Mean motion: 14.96107390 rev/day
Decay rate: 3.040e-05 rev/day^2
Epoch rev: 11090
Checksum: 290

/EX
```

220. ORBS$258.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 16:47:30 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-268.n@ampr.org>
Source record: 28629
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-268.N
2Line Orbital Elements 268.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX September 25, 1993
BID: $ORBS-268.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93261.37176135 -.00000099 00000-0 99999-4 0 354
2 14129 27.1985 5.5050 6025636 115.1006 317.3712 2.05882714 77182
UO-11
1 14781U 84 21 B 93266.58557116 .00000157 00000-0 30660-4 0 4403
2 14781 97.8054 288.6093 0013031 44.3925 315.8324 14.69056049511161
RS-10/11
1 18129U 87 54 A 93265.78298818 .00000088 00000-0 89554-4 0 6506
2 18129 82.9282 166.4889 0013289 49.2382 310.9897 13.72323480313239
AO-13
1 19216U 88 51 B 93263.37003204 .00000121 00000-0 46210-3 0 6439
2 19216 57.8512 293.7059 7210437 324.5886 4.2495 2.09718161 40355
FO-20
1 20480U 90 13 C 93262.12161713 -.00000010 00000-0 65198-5 0 4565
2 20480 99.0281 100.4732 0540198 233.7673 121.2342 12.83221116169367
AO-21
1 21087U 91 6 A 93266.75660614 .00000084 00000-0 82656-4 0 8559
2 21087 82.9460 339.8817 0036869 106.0838 254.4375 13.74525023132981
RS-12/13
1 21089U 91 7 A 93265.77234864 .00000016 00000-0 11037-4 0 4249
2 21089 82.9210 209.7390 0029281 130.1855 230.1875 13.74026602131922
ARSENE
1 22654U 93 31 B 93241.80475365 -.00000049 00000-0 99999-4 0 211
2 22654 1.3018 119.8566 2933615 152.1382 232.4293 1.42202460 1626
UO-14
1 20437U 90 5 B 93265.76629184 .00000042 00000-0 24146-4 0 7735
2 20437 98.6094 348.9428 0010156 256.6456 103.3594 14.29792387191377
AO-16
1 20439U 90 5 D 93266.18221471 .00000034 00000-0 20940-4 0 5783
```

```
2 20439 98.6174 350.3244 0010459 256.7891 103.2140 14.29850520191449
DO-17
1 20440U 90 5 E 93266.23231091 .00000039 00000-0 22905-4 0 5801
2 20440 98.6178 350.6125 0010553 255.7561 104.2451 14.29987128191467
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1 20441U 90 5 F 93266.20321397 .00000034 00000-0 20980-4 0 5826
2 20441 98.6176 350.6033 0011285 257.3247 102.6691 14.29965946191468
LO-19
1 20442U 90 5 G 93266.75863415 .00000041 00000-0 23670-4 0 5792
2 20442 98.6182 351.3494 0011457 254.5061 105.4856 14.30057190191558
UO-22
1 21575U 91 50 B 93265.11055625 .00000053 00000-0 24709-4 0 2778
2 21575 98.4659 339.6293 0008256 16.3205 343.8248 14.36851117114584
KO-23
1 22077U 92 52 B 93263.67655469 .00000000 00000-0 99999-4 0 1156
2 22077 66.0792 124.2611 0001255 353.3278 6.7724 12.86279630 52121
NOAA-9
1 15427U 84123 A 93267.03377154 .00000085 00000-0 55517-4 0 4641
2 15427 99.0906 308.8762 0014261 250.2565 109.7076 14.13547200452746
NOAA-10
1 16969U 86 73 A 93267.01531806 .00000035 00000-0 23276-4 0 3071
2 16969 98.5164 279.0966 0014086 29.6511 330.5470 14.24832292364707
NOAA-11
1 19531U 88 89 A 93266.81506369 .00000144 00000-0 87997-4 0 2172
2 19531 99.1431 244.6172 0011659 157.7475 202.4215 14.12917911257604
MET-3/3
1 20305U 89 86 A 93266.57019314 .00000043 00000-0 99999-4 0 7373
2 20305 82.5486 95.4701 0014877 232.6549 127.3218 13.16023368188047
FY-1/2
1 20788U 90 81 A 93266.93605468 .00000118 00000-0 89643-4 0 6317
2 20788 98.8542 290.3499 0016188 37.5863 322.6431 14.01296183156418
MET-2/20
1 20826U 90 86 A 93266.38605979 .00000030 00000-0 21942-4 0 5849
2 20826 82.5250 358.2521 0014777 74.1263 286.1527 13.83557857150860
MET-3/4
1 21232U 91 30 A 93266.32926582 .00000043 00000-0 99999-4 0 4043
2 21232 82.5455 358.2589 0013970 127.8840 232.3548 13.16455849116248
NOAA-12
1 21263U 91 32 A 93266.65576590 .00000132 00000-0 68104-4 0 6725
2 21263 98.6502 294.9367 0012332 292.0905 67.8960 14.22312492122645
MET-3/5
1 21655U 91 56 A 93265.30307878 .00000043 00000-0 99999-4 0 4600
2 21655 82.5525 305.9270 0013492 140.9697 219.2402 13.16823738101205
MET-2/21
1 22782U 93 55 A 93265.46522455 .00000015 00000-0 83089-5 0 159
2 22782 82.5455 58.5871 0020982 256.6669 103.2151 13.82985519 3082
MIR
1 16609U 86 17 A 93266.82873996 .00007872 00000-0 99031-4 0 3121
2 16609 51.6187 83.8687 0004427 121.5263 238.6130 15.59836341434525
HUBBLE
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1 20580U 90 37 B 93266.83838231 .00000637 00000-0 52868-4 0 1852
2 20580 28.4696 148.4226 0004359 3.4825 356.5832 14.92836713186272
GRO
1 21225U 91 27 B 93264.43702394 .00025569 00000-0 14973-3 0 9957
2 21225 28.4646 313.6871 0006116 328.7533 31.2722 15.76703769 15305
UARS
1 21701U 91 63 B 93265.74981556 .00003040 00000-0 28906-3 0 2561
2 21701 56.9838 150.5436 0004504 78.1255 282.0293 14.96107390110904
/EX
```

221. RE:9600 baud radio setup

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 18:15:01 UTC
From: bmm1@freenet.scri.fsu.edu
Message-ID: <199309241815.AA265062@freenet.scri.fsu.edu>
Source record: 28630

In-Reply-To: <9309241331.AA18552@eagle.aud.alcatel.com>; from "Tom Mcdermott" at Sep 24, 93 8:31 am
X-Mailer: ELM [version 2.3.1 PL11]

>
> Bruce: I cannot post to the newsgroup, so I will try to answer your question
> directly. You may post the response, if you like.
>
> 'tone pairs' are not used on FSK - you may be thinking about AFSK (such
> as is currently used on 1200 baud 2-meter FM packet). At 9600 baud, when
> operating FSK, you actually deviate the carrier frequency directly.
>
> This may be a little confusing, the difference is subtle.
>
> In FSK you provide two tones, one the mark, and the other the space. Let's
> say that the mark tone is 1000 hertz. Let's also assume that the carrier
> frequency is 450.000 Mhz. (don't tell the FCC!). In AFSK, when we apply
> the 1000
> sine-wave tone to the FM-modulator, we produce a carrier that moves above and
> below the channel frequency 1000 times a second. Notice we have not yet
> applied any modulation - we are just transmitting a MARK tone. How much
> does the carrier swing above and below the channel frequency? Well, that
> depends on the amount of deviation we apply to the carrier. A low amount
> of deviation, say 100 hz, wouild cause the carrier to swing from 449.99990 to
> 450.0001 Mhz 1000-times per second. A large amount of deviation, say
> 10 Khz, would cause it to swing from 449.900 to 450.010 Mhz, 1000-times
> per second.
>
> In FSK, however, we choose two channel frequencies to represent the
> MARK and the SPACE, say for example we decide to use 449.997 as the SPACE, and
> 450.003 as the MARK. We have no 'tones' to speak of. A mark (a logic one)
> is a DC level we feed to the modulator, while the SPACE (a logic zero) is
> a DIFFERENT DC level we feed to the modulator.
>
> In AFSK, we converted the DC_level of the MARK to the 1000 hertz tone,
> then applied that tone to the modulator. In FSK, we bypass the step of
> converting the MARK to a tone, and just apply the mark (the logic level)
> directly to the modulator.
>
> In reality, we will filter the transitions in the logic levels between
> MARK and SPACE a little bit, since feeding things with sharp-square voltage
> changes to the modulator would result in a very broad transmitted signal.
>
> In the US, on the 450 ham band, it is traditional to use about 3 khz deviation

> FSK for 9600 baud. That means that the SPACE is 3 khz below the channel,
> while the MARK is 3 khz above the channel (a net difference of 6 khz).
>
> Note that to achieve FSK, you must apply the modem's transmit DC type signal
> directly to the radio's crystal-varactor diode. YOU CANNOT APPLY THIS SIGNAL
> TO THE MICROPHONE JACK OF A STANDARD FM-VOICE RADIO. IT WILL NOT WORK !
>
> Speaking from substantial experience in the 9600 baud ham business, I have
> made a number of different radios work at 9600 baud. Generally, I have the
> best luck with crystal controlled commercial surplus, but others can be
> made to work - it can get complicated, though. 9600 baud FSK is not as
> forgiving as AFSK, and you should consider finding someone with an
> oscilloscope, and preferably a service monitor in order to be sucessful. I
> have to comletely characterize a radio before I use it at 9600 baud. I measure
> how sensitive the varicap is to the applied DC voltage - so I know exactly
> what signal level to apply to get exaxctly 3 khz deviation. I also have
> to check the frequency response of the TX varicap circuit to make sure
> that it does not introduce distortion. Also, I have to carefully measure the
> RX discriminator or quadrature detector response to make sure that it is
> linear, and well centered.
>
> Finally, a subtle point, some radio use low-
> side injection on the RX, others use high-side injection. Also, in the
> FM world, manufacturers don't care about the polarity of the discriminator -
> that is whether the disc produces a high-output-voltage for a higher input
> frequency, or whether it produces a lower-output-voltage for a higher input
> frequency. The upshot of this is that the received signal may be 'upside
> down'. You will have to invert the logic level if it is upside-down !!
> (Do this at the receiver, or else you will be incompatible with everyone else).
>
> Sorry for the long diatribe - hope this answers your question.
>
> Tom, N5EG
> Texas Packet Radio Society
>
>

Tom:
Thanks for your response. Lots of people answered me but none in such detail.
Diatribe appreciated. I am sort of in the collecting information stage at this
point of the project. My goal is to get onto oscars 22 & 23. I think I have
all the basic equipment and radio schematics and a scope that goes to 5mhz.
All I need now is a plan of attack. I have been on oscars 16 & 19 at 1200 bpsk
so this is an incremental step forward (although I suffered a setback when the
new version of the satellite software was compiled using the 286 instruction
set. All of a sudden I'm short a computer). My radios are a modified pro 2006
for the receiver and a old Icom IC-211 all mode 2meter transeiver. The
Pro 2006 has a nominal sensitivity of +- 9khz with a limit of +-12khz so I
have hope this may be wide enough. I'll worry about the Transmitter when I get
a downlink working. My modem is a DSP-12. If you or anyone has any hints or

any published information I would appreciate it.

Bruce.

Ps: I don't have access to a news reader either. I use Gopher to read the
news ant post via a gateway. Try sending mail to
rec-radio-amateur-space@cs.utexas.edu
or whatever news group you want to post to.
--

--
Bruce M. Marshall bmm1@freenet.fsu.edu voice 615 481 0990 fax 615 481 8039

222. UoSAT-5 (UO-22) project

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 19:21:48 UTC
From: david@w172zrz.zrz.TU-Berlin.DE
Message-ID: <27vhcc$ikq@mailgzrz.TU-Berlin.DE>
Source record: 28631

Hi there !

We`re taking part on a scientific competition called "Jugend Forscht"
for young people. We`re working on a program for decoding and analysing
the data of UoSAT-5.
We would be glad to get a big archive of data. Also it would be
helpful to connect the Univesity of Surrey. Can somebody help
us to get an e-mail address.
If somebody has ideas, infos, hints etc. please mail us!!!

AdvThanks

Thorsten Kogge, Alexander Kordecki, David Siegel

223. Two-Line Orbital Element Sets (TLE266)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-24 20:40:51 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.748903251@afit.af.mil>
Source record: 28633
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #266 -
Alouette 1
1 00424U 62 49 A 93266.28185978 .00000913 00000-0 10688-2 0 7384
2 00424 80.4679 188.3276 0024103 81.0731 279.3191 13.67783374545916
ATS 3
1 03029U 67111 A 93262.32578510 -.00000080 00000-0 99999-4 0 9799
2 03029 14.4552 10.2130 0011503 254.6292 105.2569 1.00272928 94725
Cosmos 398
1 04966U 71 16 A 93266.79987313 .00094639 29829-4 25584-3 0 4608
2 04966 51.4729 249.5595 1287838 329.6400 23.5626 13.26755287736562
Starlette
1 07646U 75010 A 93263.97386253 -.00000107 00000-0 -36357-4 0 5356
2 07646 49.8227 135.6944 0206719 167.2217 193.4027 13.82183033940618
LAGEOS
1 08820U 76039 A 93263.29879704 .00000005 00000-0 99999-4 0 6982
2 08820 109.8612 43.1256 0044134 343.1203 16.7825 6.38664550149916
ETS-2
1 09852U 77014 A 93262.43590140 .00000015 00000-0 99999-4 0 7770
2 09852 11.6635 44.7219 0001389 68.7694 291.2950 0.99997534 7950
GOES 2
1 10061U 77048 A 93261.23789507 .00000101 00000-0 99999-4 0 628
2 10061 10.6876 48.9925 0001600 64.1620 194.3938 1.00284091 4399
IUE
1 10637U 78012 A 93266.44285278 -.00000193 00000-0 00000+0 0 7903
2 10637 34.2044 99.2545 1308527 27.8798 343.4479 1.00287251 10053
GPS-0001
1 10684U 78020 A 93246.97185663 -.00000007 00000-0 99999-4 0 555
2 10684 64.4732 54.0241 0064458 163.2200 197.0153 1.98069722 99260
GPS-0002
1 10893U 78 47 A 93253.52975176 -.00000010 00000-0 99999-4 0 8081
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2 10893 63.6874 293.3716 0207761 13.4947 347.1114 2.01627581112433
GOES 3
1 10953U 78062 A 93264.56117557 .00000095 00000-0 99999-4 0 7993
2 10953 9.6175 51.6807 0006356 75.6466 259.3347 1.00278624 9034
SeaSat 1
1 10967U 78064 A 93264.02828506 .00000105 00000-0 55878-4 0 9974
2 10967 108.0095 265.1390 0002310 273.2684 86.8193 14.37871062797672
GPS-0003
1 11054U 78093 A 93264.00435079 -.00000009 00000-0 99999-4 0 9449
2 11054 63.4033 289.7048 0043601 174.8032 185.2899 1.93505395109304
Nimbus 7
1 11080U 78098 A 93266.71411826 -.00000005 00000-0 10696-4 0 1329
2 11080 99.0895 154.7913 0009641 121.7127 238.4969 13.83719757753224
GPS-0004
1 11141U 78112 A 93260.15461404 -.00000007 00000-0 99999-4 0 6244
2 11141 64.4802 54.4176 0048629 25.2931 334.9467 1.92894868107731
GPS-0005
1 11690U 80 11 A 93263.65728991 -.00000006 00000-0 99999-4 0 5720
2 11690 64.8372 55.4241 0140569 198.5037 160.9845 2.00552503114133
GPS-0006
1 11783U 80 32 A 93255.78824793 -.00000008 00000-0 99999-4 0 7755
2 11783 62.8107 287.5182 0204207 29.0570 332.1772 2.03457007 98311
GOES 5
1 12472U 81049 A 93262.52711361 .00000076 00000-0 99999-4 0 5512
2 12472 6.2591 61.1383 0004751 8.8350 351.3370 1.00217103 3059
Cosmos 1383
1 13301U 82 66 A 93265.20096091 -.00000062 00000-0 -79843-4 0 572
2 13301 82.9323 146.2496 0028695 112.1560 248.2635 13.68043162560785
LandSat 4
1 13367U 82 72 A 93266.76256225 .00000068 00000-0 20190-4 0 8618
2 13367 98.2168 324.5334 0007572 8.6914 351.4352 14.57113169595267
IRAS
1 13777U 83 4 A 93265.04263527 .00000128 00000-0 99999-4 0 3943
2 13777 98.9788 96.4838 0013960 337.1725 22.8821 13.99180531213730
Cosmos 1447
1 13916U 83 21 A 93264.90804159 .00000016 00000-0 10943-4 0 1387
2 13916 82.9433 210.0917 0039633 56.7391 303.7552 13.74294708526481
TDRS 1
1 13969U 83 26 B 93261.24420990 .00000119 00000-0 99999-4 0 506
2 13969 7.1629 53.8770 0002596 61.1835 159.0014 1.00273000 11332
GOES 6
1 14050U 83 41 A 93266.09363934 -.00000227 00000-0 99999-4 0 9507
2 14050 5.0499 63.9114 0002221 338.1923 278.4140 1.00264218 10112
OSCAR 10
1 14129U 83 58 B 93261.37176135 -.00000099 00000-0 99999-4 0 354
2 14129 27.1985 5.5050 6025636 115.1006 317.3712 2.05882714 49215
GPS-0008
1 14189U 83 72 A 93149.63940343 -.00000008 00000-0 99999-4 0 4679
2 14189 63.9879 54.1319 0135726 236.1393 123.3793 2.00563668 72374
LandSat 5
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1 14780U 84 21 A 93266.73301893 .00000051 00000-0 16338-4 0 6678
2 14780 98.2015 326.2377 0005100 18.5736 341.5587 14.57117589508670
UoSat 2
1 14781U 84 21 B 93266.58557116 .00000157 00000-0 30660-4 0 4403
2 14781 97.8054 288.6093 0013031 44.3925 315.8324 14.69056049511161
GPS-0009
1 15039U 84 59 A 93265.98328484 -.00000010 00000-0 99999-4 0 9334
2 15039 63.8063 49.4278 0052638 216.5557 143.0854 2.00562089 67982
Cosmos 1574
1 15055U 84 62 A 93265.37575392 .00000034 00000-0 30089-4 0 3896
2 15055 82.9556 262.5359 0025989 242.8901 116.9604 13.73591855463865
GPS-0010
1 15271U 84 97 A 93265.91858143 -.00000008 00000-0 99999-4 0 5699
2 15271 62.5080 287.0611 0137147 344.7415 14.8945 2.00573242 65091
Cosmos 1602
1 15331U 84105 A 93264.66067429 .00000364 00000-0 41969-4 0 633
2 15331 82.5362 329.1034 0021655 13.8854 346.2953 14.84135623484680
NOAA 9
1 15427U 84123 A 93267.03377154 .00000085 00000-0 55517-4 0 4641
2 15427 99.0906 308.8762 0014261 250.2565 109.7076 14.13547200452746
GPS-0011
1 16129U 85 93 A 93266.15029159 -.00000008 00000-0 99999-4 0 3028
2 16129 64.5688 51.3942 0131774 141.5262 219.4218 2.00564044 4800
Mir
1 16609U 86 17 A 93266.82873996 .00007872 00000-0 99031-4 0 3121
2 16609 51.6187 83.8687 0004427 121.5263 238.6130 15.59836341434525
SPOT 1
1 16613U 86 19 A 93266.80118916 .00000114 00000-0 62355-4 0 2276
2 16613 98.7190 339.7986 0000767 88.0886 272.0364 14.20034228 78753
Cosmos 1766
1 16881U 86 55 A 93265.34972974 .00000274 00000-0 31951-4 0 9141
2 16881 82.5180 26.5789 0020881 33.2463 327.0058 14.83168822385753
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1 16908U 86 61 A 93262.25963662 -.00000025 00000-0 99999-4 0 6653
2 16908 50.0122 197.3317 0010926 343.2886 16.7587 12.44408696323038
NOAA 10
1 16969U 86 73 A 93267.01531806 .00000035 00000-0 23276-4 0 3071
2 16969 98.5164 279.0966 0014086 29.6511 330.5470 14.24832292364707
MOS-1
1 17527U 87 18 A 93266.79779336 .00000134 00000-0 12493-3 0 6260
2 17527 99.0665 335.6394 0000189 41.7569 318.3595 13.94891708335805
GOES 7
1 17561U 87 22 A 93266.18947983 -.00000021 00000-0 99999-4 0 4037
2 17561 0.9568 78.5883 0003676 351.4598 247.9013 1.00276069 7303
Kvant-1
1 17845U 87 30 A 93266.82874636 -.00000634 00000-0 -45740-5 0 4336
2 17845 51.6191 83.8702 0004543 122.2255 237.9195 15.59819793434524
DMSP B5D2-3
1 18123U 87 53 A 93266.98860664 .00000046 00000-0 33340-4 0 9213
2 18123 98.7939 97.5459 0013494 218.5436 141.4777 14.15307438323354
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RS-10/11
1 18129U 87 54 A 93265.78298818 .00000088 00000-0 89554-4 0 6506
2 18129 82.9282 166.4889 0013289 49.2382 310.9897 13.72323480313239
Meteor 2-16
1 18312U 87 68 A 93265.45350709 .00000025 00000-0 16620-4 0 304
2 18312 82.5524 64.1965 0012586 137.8990 222.3133 13.84006858308025
Meteor 2-17
1 18820U 88 5 A 93265.08853479 .00000045 00000-0 35016-4 0 8895
2 18820 82.5443 121.8588 0015266 212.5953 147.4271 13.84693992285259
DMSP B5D2-4
1 18822U 88 6 A 93267.04989811 .00000101 00000-0 53552-4 0 8232
2 18822 98.4751 127.5434 0007447 43.9734 316.2027 14.22880919292676
Glonass 34
1 19163U 88 43 A 93264.53428215 .00000015 00000-0 99999-4 0 6944
2 19163 64.9712 119.4448 0007260 168.8983 191.1947 2.13102562 40930
Glonass 36
1 19165U 88 43 C 93262.71311130 .00000015 00000-0 99999-4 0 8965
2 19165 64.9363 119.4920 0004036 345.3669 14.7188 2.13102220 41513
METEOSAT 3
1 19215U 88 51 A 93265.41320359 -.00000229 00000-0 99999-4 0 6497
2 19215 1.1411 73.8009 0002478 218.2489 143.0214 1.00286035 7221
AO-13
1 19216U 88 51 B 93263.37003204 .00000121 00000-0 46210-3 0 6439
2 19216 57.8512 293.7059 7210437 324.5886 4.2495 2.09718161 8854
OKEAN 1
1 19274U 88 56 A 93265.03715238 .00000290 00000-0 35038-4 0 6142
2 19274 82.5152 126.4989 0019807 167.1868 192.9854 14.81966060281368
Meteor 3-2
1 19336U 88 64 A 93265.28473860 .00000043 00000-0 99999-4 0 639
2 19336 82.5440 153.2586 0015784 211.9212 148.0954 13.16960995247991
Glonass 39
1 19503U 88 85 C 93261.32960478 -.00000022 00000-0 99999-4 0 9508
2 19503 65.6942 358.5104 0002442 206.1629 153.8122 2.13099762 38974
NOAA 11
1 19531U 88 89 A 93263.84084492 .00000089 00000-0 58017-4 0 2168
2 19531 99.1428 241.5807 0011543 166.2328 193.9180 14.12916482257185
TDRS 2
1 19548U 88 91 B 93266.47070499 -.00000260 00000-0 99999-4 0 6848
2 19548 0.4175 79.6418 0001669 92.1800 298.1258 1.00269414 5538
Glonass 40
1 19749U 89 1 A 93260.90038970 .00000015 00000-0 99999-4 0 1711
2 19749 64.9221 119.1612 0005355 262.9369 97.0980 2.13101661 36498
Glonass 41
1 19750U 89 1 B 93260.48815853 .00000015 00000-0 99999-4 0 8930
2 19750 64.9310 119.2281 0006508 247.0308 112.9997 2.13101953 36488
GPS BII-01
1 19802U 89 13 A 93265.99264144 .00000014 00000-0 99999-4 0 6862
2 19802 55.0652 150.3045 0035951 174.5366 185.5698 2.00563374 33691
Akebono
1 19822U 89 16 A 93266.58805438 .00019802 00000-0 11013-2 0 9249
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2 19822 75.0907 331.9345 3855894 125.4118 277.0560 7.71195058 88639
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1 19851U 89 18 A 93264.78742784 .00000029 00000-0 20199-4 0 8277
2 19851 82.5200 357.9003 0013352 263.5072 96.4568 13.84343342230557
MOP-1
1 19876U 89 20 B 93262.60528489 .00000010 00000-0 00000+0 0 5798
2 19876 0.2822 19.3399 0001509 165.5971 30.3257 1.00272161 4420
TDRS 3
1 19883U 89 21 B 93266.02881769 -.00000242 00000-0 00000+0 0 6609
2 19883 0.0185 148.0613 0002212 92.2500 90.8122 1.00265408 86803
GPS BII-02
1 20061U 89 44 A 93266.33351021 -.00000029 00000-0 99999-4 0 6514
2 20061 54.7810 327.3353 0124332 203.9127 155.5603 2.00566056 31448
Nadezhda 1
1 20103U 89 50 A 93264.04710308 .00000036 00000-0 31718-4 0 7727
2 20103 82.9619 126.2513 0037684 321.7331 38.1151 13.73825013211355
GPS BII-03
1 20185U 89 64 A 93266.16658401 .00000014 00000-0 99999-4 0 6182
2 20185 54.9015 150.9644 0007576 232.4533 127.5441 2.00557866 30015
GMS 4
1 20217U 89 70 A 93266.25578755 -.00000257 00000-0 99999-4 0 6997
2 20217 0.0671 253.3824 0000239 99.4264 241.7105 1.00270893 15425
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2 22804 70.9822 148.5279 0213502 65.8545 296.4056 13.69330755 518
1993 059D
1 22805U 93 59 D 93262.67433221 -.00000076 00000-0 -58773-4 0 106
2 22805 70.9778 149.2097 0216263 90.7071 271.8809 13.68241527 467
1993 059E
1 22806U 93 59 E 93266.67964796 .00000046 00000-0 60522-4 0 95
2 22806 71.0214 141.9294 0203135 62.4803 299.6777 13.71171277 1018
1993 059F
1 22807U 93 59 F 93262.67037124 -.00000135 00000-0 -11514-3 0 73
2 22807 71.0251 149.7540 0208944 91.3276 271.1767 13.69871507 460
1993 060A
1 22808U 93 60 A 93266.91634474 .00000463 00000-0 99999-5 0 165
2 22808 65.0254 18.4402 0011755 268.5731 91.3276 15.52052005 1075
1993 060B
1 22809U 93 60 B 93260.51772533 .66713993 36096-4 56920-3 0 57
2 22809 64.9906 39.8427 0111974 54.6289 306.5295 16.34758122 73
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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224. A question..

Newsgroup: rec.radio.amateur.space
Date: 1993-09-25 02:34:00 UTC
From: gbird@cjbbs.com
Message-ID: <749015125.AA00599@cjbbs.com>
Source record: 28634

Is it possible using a 10m mobile rig and a 1/4 wave vertical get a decent signal lets say from A0-13's downlink?

Please be kind... I'm just starting out studying satellites

George
N2PHQ

225. ANS-268 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-09-26 17:10:21 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-268.01@ampr.org>
Source record: 28635
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-268.01
NEW RADIO AMATEUR PAYLOADS FLY!

HR AMSAT NEWS SERVICE BULLETIN 268.01 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.01

Radio Amateur Payloads Fly On ARIANE Launch 26-Sept-93 01:45:00 UTC

In what was a dramatic launch from the Kourou, French Guiana spaceport, with launch window almost closing, an ARIANE launch vehicle lifted off in the night to carry seven satellites to orbit. On board to give the "play-by-play" action was the AMSAT Launch Information Network Service (ALINS) which was on 75M with N8AJD and W5IU on 14.295 MHz. In support of othe ALINS was WD8LAQ at WA3NAN, the radio club of the Goddard Space Flight Center. Of these seven satellites, four are of general interest to radio amateurs. The following is a brief discription of each:

POSAT-1 is a 50 kg satellite built by Surrey Satellite Tecnology Limited (SSTL) of the University of Surrey, for LNETI (Portugal). Its mission is to receive and transmit earth images, determine its position using GPS, make radiation measurements, and receive and forward messages.

POSAT-1 :
Uplink : 145.925/145.975 MHz
Downlink: 435.250/435.275 MHz (435.250 MHz is the primary frequency)
Speed : 9600 bps (38.4Kbps probably)

KITSAT-B is a 50 kg satellite built by Korean Advanced Iinstitue of Space Technology (KAIST). Its mission is to take CCD pictures, process numerical information, measure radiation, and receive and forward messages.

KITSAT-B:
Uplink : 145.870/145.980 MHz
Downlink: 435.175/436.500 MHz
Speed : 9600 baud

EYESAT-A is a 12.5 kg was built by Interferometrics (USA). Its mission is experimental monitoring of mobile industrial equipment. It also carries an amateur radio payload which has the following frequenciies:

EYESAT-A:
Uplink : 145.850 MHz
Downlink: 436.800 MHz
Speed : 300 - 9600 baud

ITAMSAT is a 12 kg satellite built by AMSAT-ITALY. Its mission is to store and forward Amateur Radio messages like AO-16, LU-19, KO-22, and KO-23. Its transponder frequencies are as follows:

Downlink: 435.867 MHz (primary) PSK 1200 baud
435.822 MHz (secondary) PSK 1200 baud
AFSK 1200 baud (FM)
9600 baud (G3RUH)
analog transponder (FM)

Uplink: 145.875 MHz 1200 baud Manchester / 4800 baud
145.900 MHz 1200 baud Manchester / 4800 baud
145.925 MHz 1200 baud Manchester / 9600 baud /exper
145.950 MHz 1200 baud Manchester / 9600 baud

For a preliminary and "rough-cut" at the orbital elements, please insert these into your satellite tracking programs:

Satellite: EYESAT-A
Catalog number: 00001
Epoch time: 93269.08986300
Element set: 002
Inclination: 98.7470 deg
RA of node: 346.9000 deg
Eccentricity: 0.0010000
Arg of perigee: 216.9200 deg
Mean anomaly: 208.2700 deg
Mean motion: 14.29900139 rev/day
Decay rate: 0.00e-00 rev/day^2
Epoch rev: 2

Beacause all the satellites will be initially be "bunched-up" together, this element set will work for the first few days. Please allow plenty of time before the computed the AOS time to listen for these passes. As newer and more accurate elements become known, they will be published via the AMSAT News Service (ANS) bulletins. Also, please stay tuned to the AMSAT HF/VHF and look for ANS bulletins about the current status of theses new satellites.

/EX
SB SAT @ AMSAT $ANS-268.02
UO-11 STATUS REPORT

HR AMSAT NEWS SERVICE BULLETIN 268.02 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.02

G0SXY/KO5I Reports That UO-11 Is Functioning

G0SXY believe that the UO-11 anomaly was caused by two factors (1) the gradual precession of the orbit plane to a position normal to the sun vector and (2) modifications to the FORTH software magnetorquing routines.

Over the course of its 9.5 year mission, UO-11's orbit has drifted. The satellite is now in a 6 AM 6 PM sun synchronous orbit. This means that the satellite is always in sunlight. It also means that gravity gradient lock is essential for good power generation. With the sun in the orbit-normal, some other quasi-stable attitudes have particularly poor power generation. During modifications to the ancient FORTH diary operating system, an incorrect sign inversion was applied to magnetometer data; this lead to non-nominal attitude, which lead to poor power generation. Eventually, the power system started to "shed loads" starting with the transmitters and moving to the computers. Hence the OBC 1802 and DCE NSC800 went down. Generally, one or the other of the computers is essential to being able to command UO-11, hence we were unable to command until the 2-meter beacon was automatically shut down.

Long-time UO-11 buffs will be interested to know that the spacecraft's new orbit plane makes the satellite warmer. This seems to have restored to operation an intermittant data detector circuit. It was the failure of this circuit shortly after launch in 1984 which lead to the 3-month loss of UoSAT-2.

The following is from UoSAT-OSCAR-22:

>From : G0SYX
To : ALL
Title : UO-11 Status Report
Keywords : UO11
Uploader : G0SYX
Uploaded : Tue Sep 21 10:31:42 1993

UoSAT-OSCAR 11 Status Report

Controllers at the University of Suurey have been successful in regaining command of the UoSAT-2 spacecraft. The command lost timer timed out at roughly 18:37 UTC on Saturday 18 September and during the next pass over the UK controllers were able to command the spacecraft to turn on its 70 cm beacon. An examination of telemetry showed that the spacecraft is in good health.

Because both the OBC 1802 and DCE aboard UO-11 had crashed leading to the inability to issue ground commands to the spacecraft, controllers will now have to begin the process of reloading the flight software into the flight computers aboard the spacecraft. This process will take several orbits to complete. In additon, key UoSAT operational personnel are currently involved in the pre-flight preparations for the Araine V-59 launch scheduled to take place later this week. As a result the process of reloading the flight software to UO-11 will be further delayed. Every effort will be made to return UO-11 to an operational state as soon as possible.

Once the spacecraft is returned to service additional operational activities are being planned for UO-11. Watch the UO-11 bulletins for further details.

G0SYX and the other controllers at UoSAT would like to express their appreciation to all those individuals who provided telemetry and reception reports to the UoSAT command team following the disruption of UO-11 service.

Later bulletins will be issued as more details become available.

[The AMSAT News Service (ANS) would like to thank G0SYX/KO5I who is part of the UoSAT Command Team.]

/EX
SB SAT @ AMSAT $ANS-268.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 268.03 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

2-Oct-93 1400 B 160 WA5ZIB WJ9F
9-Oct-93 1500 B 101 W9ODI N7NQM
23-Oct-93 1315 B 154 WB6LLO WA5ZIB
30-Oct-93 1300 B 62 W5IU WB6LLO

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-268.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 268.04 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.04

Weekly OSCAR Status Reports: 25-SEP-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 25-Oct 25
Mode-B : MA 0 to MA 90 !
Mode-BS : MA 90 to MA 120 !
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Blon/Blat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, Oct 25
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: Operating normally. [WH6I]

MIR: R0MIR has been pretty busy recently, since they apparently suffered solar panel damage recently in a meteor shower. They had an Extra Vehicular Activity (EVA) spacewalk, possibly two last week, and have another scheduled for Monday. Apparently, when they are preparing for EVA, they turn the radios off. They have been NOT heard on voice lately. When MIR is over the central and south the Texas area, R0MIR is on packet. In a recent chat with Sergei by N5JXS, and Sergi indicated that the EVAs that they are performing are not of an "emergency" nature, but are necessary repairs to the spacestation. Additional reports to me from N6JLH and N6WDV indicate good results on packet uploads from the West Coast, and the occasional voice contact when Alex sees who's connected. N6JLH, indicates that if you're sending private messages to the MIR crew, to keep them short, and to translate to Russian, if you can. Alex does speak pretty good English, but if it's in Russian, it's easier for him to read and answer. [N5JXS]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX
SB SAT @ AMSAT $ANS-268.05
AMSAT-NA SPACE SYMPOSIUM INFO

HR AMSAT NEWS SERVICE BULLETIN 268.05FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.05

AMSAT-NA Space Symposium Set For 7-11 OCT In Arlington, TX

Arrangements are being finalized for the AMSAT-NA Annual Meeting and Space Symposium '93. The proceedings are at the printers and the speakers list is full (30 Speakers!). The Saturday evening Banquet Program has now been arranged and will be very entertaining. There is still time to register. Call AMSAT Headquarters at (301)589-6062 for registration. Pre-registration deadline is 1 October. Hotel reservations can be made at (800)453-7909 or (817)640-4142. Be sure to mention you are with AMSAT.

If you are coming to the Surplus Store Tour on 7 October, please be sure to indicate this. If you are driving to Arlington and can help provide transportation for Thursday and/or Friday evening please so indicate.

This promises to be one of the best Symposiums yet so don't miss it. See you in Arlington, TX, 7-10 October 93!

Keith Pugh, W5IU

/EX
SB SAT @ AMSAT $ANS-268.06
STATUS ABOUT POSAT-1

HR AMSAT NEWS SERVICE BULLETIN 268.06 FROM AMSAT HQ
SILVER SPRING, MD SEPTEMBER 25, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-268.06

G0/K8KA Provides Status On POSAT-1 & HEALTHSAT

HealthSat-2 and PoSAT-1 are in orbit, operating nominally. These are the 6th and 7th SSTL-built microsatellites launched on the Ariane-4 ASAP.

The SSTL command station at Guildford (Surrey, UK) commanded HealthSat-2 transmitters on at 09:10 UTC this morning. PoSAT-1 was commanded on by the SINTRA command station (Lisbon, Portugal) during the following orbit at approximately 10:50 GMT. Telemetry points indicate that both satellites are in good condition. At 12:26 GMT ground controllers commenced loading the 80C186 on-board computer with software. The initial software load comprises the SCOS multi-tasking kernaland packet radio drivers (from BekTeK) and the SSTL microsatellite file system and housekeeping integration tasks. This software will allow controllers to schedule whole-orbit data surveys and other timed events. Following this basic software load, the Attitude Determination, Control and Stabilization (ADCS) software task will be loaded and initial manoeuvers will commence. The goal of the initial ADCS operation is to place the satellite into a very slow tumble prior to deployment of the gravity-gradient boom.

PoSAT-1 is an experimental satellite carrying both non-amateur and amateur radio frequency equipment. During commissioning, PoSAT-1 is operating on its non-amateur downlink; it is hoped that amateur operations will commence after initial satellite checkout. Portugese authorities allocated the PoSAT non-amateur frequencies below the European 430-440 MHz amateur band. Although the US amateur band extends as low as 420 MHz, no interference between PoSAT and terrestrial amateur communications is expected.

HealthSat-2 is an entirely non-amateur satellite operating in the WARC-92 "Little LEO" frequency bands. The satellite is owned by the organization SatelLife which will use it for store-and-forward communications in support of medical information exchange.

SSTL extends congratulations to Interferometrices, IT-AMSAT and KAIST on their successful V-59 microsatellite launches.

Further status reports will be issued throughout the day.

Surrey Satellite Technology Limited (SSTL)
Centre for Satellite Engineering Research
University of Surrey
Guildford
United Kingdom
Fax +44 483 50 95 03
Internet (temporary) 100064.2616@compuserve.com
Internet (permanent) ees1jw@ee.surrey.ac.uk

/EX

226. Re: A question..

Newsgroup: rec.radio.amateur.space
Date: 1993-09-27 17:37:42 UTC
From: k9jma@cbnewsc.cb.att.com
Message-ID: <CE0wz6.8yx@cbnewsc.cb.att.com>
Source record: 28636

In article <749015125.AA00599@cjbbs.com> gbird@cjbbs.com (George Bird) writes:
>Is it possible using a 10m mobile rig and a 1/4 wave vertical get a decent
>signal lets say from A0-13's downlink?

Well, AO-13 has no 10m downlink. However the 10m transmitters on RS-10 and
RS-12 deliver very good signals. I regularly use a 10m quarter wave
vertical for RX in the fixed station - and have worked a number of
mobile stations thru both RS-10 and 12.

While looking at a Radio Shack SWL RX I was able to copy RS-10 beacon
with just the built in "whip" fully extended to about 4' long.

73
--
Ed Schaefer K9JMA ham radio N97178 aviation

227. Re: A question..

Newsgroup: rec.radio.amateur.space
Date: 1993-09-27 19:22:49 UTC
From: tedwards@eng.umd.edu
Message-ID: <287ei9INNbcq@mojo.eng.umd.edu>
Source record: 28637

In article <749015125.AA00599@cjbbs.com> gbird@cjbbs.com (George Bird) writes:
>Is it possible using a 10m mobile rig and a 1/4 wave vertical get a decent signal lets say from A0-13's downlink?

I think you are talking about RS-10/11. Unless I am really missing something, I don't think there is any 10m equipment on AO-13. AO-13 is a high elliptical orbit satellite, and is usually very far away (tens of thousands of km), and you _NEED_ high gain multi-element beam antennas to communicate with it.

RS-10/11 is a different beast altogether. It is in a much lower circular orbit (sun-synchronous?) Because it is so near, it is possible to get into it with a lot of power going into a 1/4 wave antenna on 2 meters (50 watts or more), and the downlink is trivial to pick up with any decent 10m antenna.

So your answer is: yes, you can pick up the RS-10/11 beacon on 10m trivially on your mobile rig (as long as the sat is above the horizon). You can also pick up any of the 2m or 440 sat beacons with just a 1/4 wave vertical (such as AO-16, AO-21, LO-19, Mir space station, etc.) I have even heard Mir on a hand held with a rubber duck outside.

-Thomas

228. Call for Abstracts (SPACECAST 2020)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-30 02:04:56 UTC
From: auspace@afit.af.mil
Message-ID: <tkelso.749354696@afit.af.mil>
Source record: 28638

CALL FOR ABSTRACTS

AIR FORCE STUDY
on
Technology and Innovative Applications of Space Hardware

The United States Air Force is conducting a study to identify creative technologies and innovative applications of hardware that will support national security well into the next century. Air University at Maxwell AFB, Alabama is chairing the study, which will be called SPACECAST 2020. The product will recommend specific technologies and applications that have the greatest potential.

Included in the first phase of this effort is the solicitation of "brainstorming" abstracts from government agencies, industry, academia, and private individuals. The Air Force Institute of Technology at Wright-Patterson AFB, Ohio will handle these abstracts for the study. Abstracts are needed in three areas:

1. Emerging research technologies that, if exploited, can significantly improve the capabilities of our space systems (to include satellite design, reliability, remote sensing, data processing, power production, stealth, etc.).

2. Innovative space systems and applications for military purposes.

3. Prior studies and briefings on future military space systems.

If you have information in these areas, please provide one-page abstracts that include:

1. A brief description of the concept.

2. Your understanding of the concept's military application and associated technical risks and tradeoffs.

3. Your name and how you can be contacted.

Please remember the emphasis is on NEW or INNOVATIVE technologies and uses for systems that could be fielded by the year 2020. Also, please limit responses to one abstract per page with classification no higher than SECRET. Your support is appreciated.

Abstract submittal by 15 October 1993 is requested. However, abstracts submitted by 1 March 1994 will be included in the study. Please submit abstracts to:

AU SPACE STUDY TECHNOLOGY TEAM
AFIT/ENA (AFIT/ENAS if abstract is classified)
2950 P STREET
WRIGHT-PATTERSON AFB OH 45433-7765

EMAIL: AUSPACE@AFIT.AF.MIL
FAX: DSN 986-7302 or (513) 476-7302
PHONE: DSN 785-7210 or (513) 255-7210
--
Lt Col TS Kelso Deputy Chief, Technology Assessment Team
tkelso@afit.af.mil Spacecast 2020
auspace@afit.af.mil Air Force Institute of Technology

229. Call for Abstracts (SPACECAST 2020)

Newsgroup: rec.radio.amateur.space
Date: 1993-09-30 02:05:12 UTC
From: auspace@afit.af.mil
Message-ID: <tkelso.749354712@afit.af.mil>
Source record: 28639
Cross-posted to: rec.radio.amateur.space,rec.radio.info

CALL FOR ABSTRACTS

AIR FORCE STUDY
on
Technology and Innovative Applications of Space Hardware

The United States Air Force is conducting a study to identify creative technologies and innovative applications of hardware that will support national security well into the next century. Air University at Maxwell AFB, Alabama is chairing the study, which will be called SPACECAST 2020. The product will recommend specific technologies and applications that have the greatest potential.

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2. Innovative space systems and applications for military purposes.

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1. A brief description of the concept.

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3. Your name and how you can be contacted.

Please remember the emphasis is on NEW or INNOVATIVE technologies and uses for systems that could be fielded by the year 2020. Also, please limit responses to one abstract per page with classification no higher than SECRET. Your support is appreciated.

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AFIT/ENA (AFIT/ENAS if abstract is classified)
2950 P STREET
WRIGHT-PATTERSON AFB OH 45433-7765

EMAIL: AUSPACE@AFIT.AF.MIL
FAX: DSN 986-7302 or (513) 476-7302
PHONE: DSN 785-7210 or (513) 255-7210
--
Lt Col TS Kelso Deputy Chief, Technology Assessment Team
tkelso@afit.af.mil Spacecast 2020
auspace@afit.af.mil Air Force Institute of Technology

230. AMRAD-OSCAR 27 IN ORBIT

Newsgroup: rec.radio.amateur.space
Date: 1993-09-30 23:56:43 UTC
From: ramays@amrad.win.net
Message-ID: <83@amrad.win.net>
Source record: 28640

AMRAD Announces the Launch of AMRAD-OSCAR 27

The Amateur Radio Research and Development Corporation (AMRAD), of McLean, Virginia, is proud to announce the launch and activation of a new orbiting satellite carrying amateur radio (OSCAR), named AMRAD OSCAR 27 (AO-27). Launch was at 0145 UTC on Sunday, 26 September onboard the Ariane V.59 mission from the Guyanis Space Center in Kourou, French Guiana. AMRAD OSCAR was inserted into orbit about 24 minutes after liftoff and was one of seven satellites launched on this mission. AMRAD OSCAR 27 was activated on the next orbit as it passed over the command station near Washington, DC, and was heard by AMRAD members throughout the area.

AMRAD-OSCAR 27 is a secondary amateur communications payload carried aboard the EYESAT-1 commercial microsatellite built by Interferometrics, Inc., of Vienna, Virginia. The amateur equipment on the satellite was constructed by members of AMRAD, a non-profit organization based in the Northern Virginia suburbs of Washington, D.C. Building on its reputation for "high tech ham radio" projects, the AMRAD group built the AMRAD OSCAR 27 payload to conduct digital satellite communications experiments. The payload is now transmitting 1,200 bps AFSK on a frequency of 436.8 MHz on a part time schedule during the on-orbit checkout and commissioning of the parent EYESAT-1 satellite. AMRAD members are preparing information for future release on how to receive and decode telemetry from the AMRAD OSCAR 27 payload. Progress reports on experiments will be distributed on the networks, and provided to the press.

AMRAD congratulates the KITSAT and ITAMSAT teams and the University of Surrey on the launch and activation of their satellites. AMRAD thanks AMSAT-NA for the technical support and encouragement provides during the construction and preparation of the AMRAD OSCAR payload.

For more information about AMRAD, and the AMRAD OSCAR 27 payload, contact AMRAD at P.O. Drawer 6148, McLean, VA 22106-6148. Or call the AMRAD BBS at (703) 734-1387. AMRAD meets each month on the second Thursday at the Dolley Madison Library in McLean, Virginia for technical talks. Club business discussions are limited to the December meeting. AMRAD operates the 147.21 repeater which covers Northern Virginia, Washington, DC, and parts of Maryland.

231. * SpaceNews 04-Oct-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-10-01 15:19:20 UTC
From: John Magliacane <kd2bd@ka2qhd.ocpt.ccur.com>
Message-ID: <$spc1004@ampr.org>
Source record: 28642
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1004
* SpaceNews 04-Oct-93 *

BID: $SPC1004

=========
SpaceNews
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MONDAY OCTOBER 4, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* NASA NEWS *
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Launched in October, 1989, the Galileo spacecraft has chalked up another success on its way to Jupiter. On September 22, the spacecraft played back a high-resolution picture of the asteroid Ida. The telemetry data rate has been reduced from 40 to 10 bits per second owing to increasing distance. The higher rate will return for a few months in 1994 when Galileo will playback more Ida data.

Galileo is scheduled to go into orbit around Jupiter and relay data from a probe in its atmosphere on December 7, 1995.

Currently, spacecraft conditions are excellent. Since the high-gain antenna is still only partly deployed, controllers plan to use the low gain antenna for the upcoming Jupiter mission.

As the Magellan spacecraft continues in a gravity-mapping orbit around Venus, the spacecraft's conditions are very good. Magellan was able to enter its current orbit by aerobraking, an experimental operation which was completed between May and August of this year. Magellan's precision tracking is providing data on the planet's gravitational field.

[Info via NASA]

* OSCAR-11 UPDATE *
===================
UoSAT-OSCAR-11 was recovered from an OBC crash last Saturday (18 September).

Controllers believe that the UO-11 anomaly was caused by two factors: (1) the gradual precession of the orbit plane to a position normal to the sun vector and (2) modifications to the FORTH software magnetorquing routines.

Over the course of its 9.5 year mission, UO-11's orbit has drifted. The satellite is now in a 6 AM / 6 PM sun synchronous orbit. This means that the satellite is always in sunlight. It also means that gravity gradient lock is essential for good power generation. With the sun in the orbit-normal, some other quasi-stable attitudes have particularly poor power generation. During modifications to the ancient FORTH diary operating system, an incorrect sign inversion was applied to magnetometer data. This lead to non-nominal attitude, which lead to poor power generation. Eventually, the power system started to "shed loads" starting with the transmitters and moving to the computers. Hence the OBC 1802 and DCE NSC800 went down. Generally, one or the other of the computers is essential to being able to command UO-11, hence controllers were unable to command until the 2-meter beacon was automatically shut down.

Long-time UoSAT-2 buffs will be interested to know that the spacecraft's new orbit plane makes the satellite warmer. This seems to have restored to operation an intermittant data detector circuit. It was the failure of this circuit shortly after launch in 1984 which lead to the 3-month loss of UoSAT-2.

G0SYX and the other controllers at UoSAT would like to express their appreciation to all those individuals who provided telemetry and reception reports to the UoSAT command team following the disruption of UO-11 service.

Later bulletins will be issued as more details become available.

[Info via Jeff Ward]

* WEBERSAT NEWS *
==========
The following packet frames were copied from WEBERSAT-OSCAR-18 by KD2BD:

WEBER-1>CAST <UI>:

25-Sep-93

Spectrum every Monday.

Week 2 WOD (variable channels) at 10 seconds

59 0x3B impact

30 0x1E array V

38 0x26 -X cur

39 0x27 +X cur

40 0x28 -Y cur

41 0x29 +Y cur

kb7kcl

* NEW OSCAR NEWS *
==========
An Ariane rocket blasted off late Saturday from the Kourou Space Center on

a mission to put into orbit seven satellites, officials said. The 59th rocket of the European consortium Arianespace lifted off from its jungle launch pad at 01:45 UTC. Among those seven satellites were a cluster of new Amateur Radio communications satellites known as OSCARs.

After some consultation with AMSAT-NA, AMSAT-UK, SSTL and the other microsat owners, an agreement on the satellite numbering was reached and is as follows:

- OSCAR-24 will be skipped awaiting the final decision from Arsene. We all agree that Arsene is AO-24 but of course the request and final decision comes from RACE.

- The first Amateur microsat from V-59 to be separated is Kitsat-B that will become Kitsat Oscar 25 (KO-25).

- Itamsat and Eyesat were separated at the same time and we agree that since the Itamsat project started some two years before Eyesat, Itamsat becomes ITAMSAT Oscar 26 (IO-26) and Eyesat becomes AMRAD Eyesat 27 (AO-27).

It is not yet clear if PoSat will join the Amateur satellite family, if the decision is positive (and we all will be pleased to have this sophisticated bird on our side) it will be PoSat Oscar 28 (PO-28).

Following AOS and LOS timing we have identified Itamsat with the object V59-D. We should have all microsats identified as follows:

V59-C 22825 Eyesat (AO-27)
V59-D 22826 Itamsat (IO-26)
V59-E 22827 Kitsat-B (KO-25)
V59-F 22828 Healthsat
V59-G 22829 PoSat

At 09:11 UTC on the 26th of September 1993, upon control from Earth, the ITAMSAT PSK beacon at 435.870 MHz was turned on, and the first frames of MBL telemetry gathered. All telemetry looks nominal, and the batteries are being recharged.

The following packet frames were copied from ITAMSAT by KD2BD on 27-Sep-93 at 01:38 UTC on 435.867 MHz:

ITMSAT>MBLCTL <UI>:
TeHYZ/
ITMSAT>MBLCTL <UI>:
TdZ[0
ITMSAT>MBLCTL <UI>:
TcHZ[0
ITMSAT>MBLCTL <UI>:
TbZ[0
ITMSAT>MBLCTL <UI>:
TaHYZ0

[Info via LW2DTZ, I2KBD, and IK1SLD]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

AB3F WA6WZO KB9HRB

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

232. ORBS$275.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-01 16:42:08 UTC
From: Richard Campbell <G_RCAMPBELL@qualcomm.com>
Message-ID: <$orbs-275.o@ampr.org>
Source record: 28647
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-275.O
Orbital Elements 275.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV HEWITT, TX October 2, 1993
BID: $ORBS-275.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93269.62632466
Element set: 37
Inclination: 27.3156 deg
RA of node: 4.2989 deg
Eccentricity: 0.6026531
Arg of perigee: 117.2716 deg
Mean anomaly: 315.3887 deg
Mean motion: 2.05880833 rev/day
Decay rate: -5.3e-07 rev/day^2
Epoch rev: 7735
Checksum: 310

Satellite: UO-11
Catalog number: 14781
Epoch time: 93273.60110102
Element set: 442
Inclination: 97.8037 deg
RA of node: 295.3091 deg
Eccentricity: 0.0012843
Arg of perigee: 24.5844 deg
Mean anomaly: 335.5972 deg
Mean motion: 14.69058828 rev/day
Decay rate: 1.81e-06 rev/day^2
Epoch rev: 51219
Checksum: 299

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93274.02182318
Element set: 654
Inclination: 82.9289 deg
RA of node: 160.4043 deg
Eccentricity: 0.0012963
Arg of perigee: 29.9551 deg
```

Mean anomaly: 330.2339 deg
Mean motion: 13.72323681 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 31436
Checksum: 300

Satellite: AO-13
Catalog number: 19216
Epoch time: 93269.09187191
Element set: 645
Inclination: 57.8473 deg
RA of node: 292.7149 deg
Eccentricity: 0.7211645
Arg of perigee: 324.9411 deg
Mean anomaly: 4.2235 deg
Mean motion: 2.09727479 rev/day
Decay rate: -2.32e-06 rev/day^2
Epoch rev: 6844
Checksum: 324

Satellite: FO-20
Catalog number: 20480
Epoch time: 93262.12161713
Element set: 456
Inclination: 99.0281 deg
RA of node: 100.4732 deg
Eccentricity: 0.0540198
Arg of perigee: 233.7673 deg
Mean anomaly: 121.2342 deg
Mean motion: 12.83221116 rev/day
Decay rate: -1.0e-07 rev/day^2
Epoch rev: 16936
Checksum: 259

Satellite: AO-21
Catalog number: 21087
Epoch time: 93271.63376897
Element set: 860
Inclination: 82.9460 deg
RA of node: 336.2742 deg
Eccentricity: 0.0036941
Arg of perigee: 92.9638 deg
Mean anomaly: 267.5716 deg
Mean motion: 13.74525333 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 13365
Checksum: 333

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93271.88921976

Element set: 426
Inclination: 82.9212 deg
RA of node: 205.2035 deg
Eccentricity: 0.0029589
Arg of perigee: 113.4076 deg
Mean anomaly: 247.0196 deg
Mean motion: 13.74026739 rev/day
Decay rate: 1.4e-07 rev/day^2
Epoch rev: 13276
Checksum: 313

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93253.49977207
Element set: 23
Inclination: 1.2946 deg
RA of node: 120.3715 deg
Eccentricity: 0.2933550
Arg of perigee: 152.0186 deg
Mean anomaly: 99.4287 deg
Mean motion: 1.42203372 rev/day
Decay rate: -5.6e-07 rev/day^2
Epoch rev: 178
Checksum: 283

/EX
SB KEPS @ AMSAT $ORBS-275.D
Orbital Elements 275.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV HEWITT, TX October 2, 1993
BID: $ORBS-275.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93273.74402670
Element set: 776
Inclination: 98.6085 deg
RA of node: 356.8274 deg
Eccentricity: 0.0010315
Arg of perigee: 231.2276 deg
Mean anomaly: 128.7984 deg
Mean motion: 14.29793569 rev/day
Decay rate: 3.9e-07 rev/day^2
Epoch rev: 19251
Checksum: 334

Satellite: AO-16
Catalog number: 20439
Epoch time: 93273.73976057
Element set: 581

Inclination: 98.6151 deg
RA of node: 357.7986 deg
Eccentricity: 0.0010489
Arg of perigee: 232.0276 deg
Mean anomaly: 127.9958 deg
Mean motion: 14.29851668 rev/day
Decay rate: 3.2e-07 rev/day^2
Epoch rev: 19252
Checksum: 352

Satellite: DO-17
Catalog number: 20440
Epoch time: 93273.71916563
Element set: 583
Inclination: 98.6160 deg
RA of node: 358.0199 deg
Eccentricity: 0.0010677
Arg of perigee: 231.7721 deg
Mean anomaly: 128.2500 deg
Mean motion: 14.29988043 rev/day
Decay rate: 2.3e-07 rev/day^2
Epoch rev: 19253
Checksum: 307

Satellite: WO-18
Catalog number: 20441
Epoch time: 93273.83012265
Element set: 584
Inclination: 98.6150 deg
RA of node: 358.1481 deg
Eccentricity: 0.0011162
Arg of perigee: 231.6967 deg
Mean anomaly: 128.3213 deg
Mean motion: 14.29967002 rev/day
Decay rate: 3.1e-07 rev/day^2
Epoch rev: 19255
Checksum: 289

Satellite: LO-19
Catalog number: 20442
Epoch time: 93273.75535182
Element set: 581
Inclination: 98.6159 deg
RA of node: 358.2718 deg
Eccentricity: 0.0011457
Arg of perigee: 231.7620 deg
Mean anomaly: 128.2531 deg
Mean motion: 14.30058435 rev/day
Decay rate: 4.5e-07 rev/day^2
Epoch rev: 19255
Checksum: 304

Satellite: UO-22
Catalog number: 21575
Epoch time: 93273.74550175
Element set: 280
Inclination: 98.4631 deg
RA of node: 348.1156 deg
Eccentricity: 0.0007889
Arg of perigee: 352.8348 deg
Mean anomaly: 7.2724 deg
Mean motion: 14.36853144 rev/day
Decay rate: 9.2e-07 rev/day^2
Epoch rev: 11582
Checksum: 316

Satellite: KO-23
Catalog number: 22077
Epoch time: 93263.67655469
Element set: 115
Inclination: 66.0792 deg
RA of node: 124.2611 deg
Eccentricity: 0.0001255
Arg of perigee: 353.3278 deg
Mean anomaly: 6.7724 deg
Mean motion: 12.86279630 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5212
Checksum: 275

Satellite: AO-27
Catalog number: 22825
Epoch time: 93274.12386161
Element set: 5
Inclination: 98.6809 deg
RA of node: 347.1732 deg
Eccentricity: 0.0007375
Arg of perigee: 241.9084 deg
Mean anomaly: 118.1352 deg
Mean motion: 14.27580958 rev/day
Decay rate: -1.03e-06 rev/day^2
Epoch rev: 72
Checksum: 297

Satellite: IO-26
Catalog number: 22826
Epoch time: 93272.86199979
Element set: 4
Inclination: 98.6803 deg
RA of node: 345.9208 deg
Eccentricity: 0.0007952
Arg of perigee: 245.7224 deg
Mean anomaly: 114.3082 deg
Mean motion: 14.27684427 rev/day

Decay rate: 6.55e-06 rev/day^2
Epoch rev: 53
Checksum: 325

Satellite: KO-25
Catalog number: 22827
Epoch time: 93274.12314011
Element set: 2
Inclination: 98.6789 deg
RA of node: 347.1689 deg
Eccentricity: 0.0008256
Arg of perigee: 229.1961 deg
Mean anomaly: 130.8504 deg
Mean motion: 14.27785690 rev/day
Decay rate: 3.17e-06 rev/day^2
Epoch rev: 72
Checksum: 304

Satellite: PO-28
Catalog number: 22829
Epoch time: 93272.52017860
Element set: 6
Inclination: 98.6060 deg
RA of node: 345.6230 deg
Eccentricity: 0.0034766
Arg of perigee: 196.6232 deg
Mean anomaly: 211.5064 deg
Mean motion: 14.27308199 rev/day
Decay rate: 2.889e-05 rev/day^2
Epoch rev: 49
Checksum: 310

/EX
SB KEPS @ AMSAT $ORBS-275.W
Orbital Elements 275.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV HEWITT, TX October 2, 1993
BID: $ORBS-275.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93270.64371502
Element set: 466
Inclination: 99.0908 deg
RA of node: 312.5447 deg
Eccentricity: 0.0014265
Arg of perigee: 238.9646 deg
Mean anomaly: 121.0126 deg
Mean motion: 14.13548181 rev/day
Decay rate: 9.6e-07 rev/day^2

Epoch rev: 45325
Checksum: 304

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93273.05454252
Element set: 310
Inclination: 98.5172 deg
RA of node: 284.9563 deg
Eccentricity: 0.0014001
Arg of perigee: 12.2442 deg
Mean anomaly: 347.9080 deg
Mean motion: 14.24833054 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 36555
Checksum: 282

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93270.92231825
Element set: 221
Inclination: 99.1447 deg
RA of node: 248.8132 deg
Eccentricity: 0.0012208
Arg of perigee: 146.2203 deg
Mean anomaly: 213.9754 deg
Mean motion: 14.12918124 rev/day
Decay rate: 7.3e-07 rev/day^2
Epoch rev: 25818
Checksum: 281

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93273.86875201
Element set: 739
Inclination: 82.5458 deg
RA of node: 90.3189 deg
Eccentricity: 0.0014966
Arg of perigee: 211.3850 deg
Mean anomaly: 148.6353 deg
Mean motion: 13.16023150 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18900
Checksum: 292

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93273.93341747
Element set: 634
Inclination: 98.8529 deg
RA of node: 297.1371 deg

Eccentricity: 0.0015867
Arg of perigee: 19.0735 deg
Mean anomaly: 341.1022 deg
Mean motion: 14.01299199 rev/day
Decay rate: 1.77e-06 rev/day^2
Epoch rev: 15738
Checksum: 333

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93273.83481420
Element set: 586
Inclination: 82.5293 deg
RA of node: 352.3318 deg
Eccentricity: 0.0014876
Arg of perigee: 56.8293 deg
Mean anomaly: 303.4292 deg
Mean motion: 13.83559207 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 15189
Checksum: 320

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93273.09340954
Element set: 406
Inclination: 82.5472 deg
RA of node: 353.4800 deg
Eccentricity: 0.0014452
Arg of perigee: 113.4554 deg
Mean anomaly: 246.8089 deg
Mean motion: 13.16456469 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11712
Checksum: 287

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93271.08767618
Element set: 677
Inclination: 98.6498 deg
RA of node: 299.2850 deg
Eccentricity: 0.0012033
Arg of perigee: 277.9887 deg
Mean anomaly: 81.9937 deg
Mean motion: 14.22313745 rev/day
Decay rate: 1.29e-06 rev/day^2
Epoch rev: 12327
Checksum: 344

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93274.04083301
Element set: 463
Inclination: 82.5537 deg
RA of node: 299.7610 deg
Eccentricity: 0.0014526
Arg of perigee: 119.9853 deg
Mean anomaly: 240.2720 deg
Mean motion: 13.16823685 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10234
Checksum: 290

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93272.04890292
Element set: 17
Inclination: 82.5458 deg
RA of node: 53.3688 deg
Eccentricity: 0.0020914
Arg of perigee: 237.8672 deg
Mean anomaly: 122.0460 deg
Mean motion: 13.82985484 rev/day
Decay rate: 9.0e-08 rev/day^2
Epoch rev: 399
Checksum: 316

/EX
SB KEPS @ AMSAT $ORBS-275.M
Orbital Elements 275.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV HEWITT, TX October 2, 1993
BID: $ORBS-275.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93273.55553133
Element set: 328
Inclination: 051.6206 deg
RA of node: 050.0286 deg
Eccentricity: 0.0004335
Arg of perigee: 158.3682 deg
Mean anomaly: 201.8178 deg
Mean motion: 15.59935938 rev/day
Decay rate: 7.726e-05 rev/day^2
Epoch rev: 43556
Checksum: 315

Satellite: HUBBLE
Catalog number: 20580

Epoch time: 93273.92510529
Element set: 196
Inclination: 28.4692 deg
RA of node: 102.7442 deg
Eccentricity: 0.0004582
Arg of perigee: 75.3996 deg
Mean anomaly: 284.7099 deg
Mean motion: 14.92845272 rev/day
Decay rate: 6.77e-06 rev/day^2
Epoch rev: 18732
Checksum: 330

Satellite: GRO
Catalog number: 21225
Epoch time: 93274.05553739
Element set: 2
Inclination: 28.4609 deg
RA of node: 243.2107 deg
Eccentricity: 0.0006141
Arg of perigee: 87.0457 deg
Mean anomaly: 273.0958 deg
Mean motion: 15.77261674 rev/day
Decay rate: 3.2256e-04 rev/day^2
Epoch rev: 1681
Checksum: 288

Satellite: UARS
Catalog number: 21701
Epoch time: 93273.96827791
Element set: 257
Inclination: 56.9841 deg
RA of node: 117.6286 deg
Eccentricity: 0.0004646
Arg of perigee: 96.4517 deg
Mean anomaly: 263.7045 deg
Mean motion: 14.96165173 rev/day
Decay rate: 3.301e-05 rev/day^2
Epoch rev: 11213
Checksum: 307

/EX
----

233. ORBS$275.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-10-01 16:43:40 UTC
From: G_RCAMPBELL@qualcomm.com
Message-ID: <$orbs-275.n@ampr.org>
Source record: 28643
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-275.N
2Line Orbital Elements 275.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM N3FKV HEWITT, TX October 2, 1993
BID: $ORBS-275.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83 58 B 93269.62632466 -.00000053 00000-0 99999-4 0 376
2 14129 27.3156 4.2989 6026531 117.2716 315.3887 2.05880833 77357
UO-11
1 14781U 84 21 B 93273.60110102 .00000181 00000-0 34679-4 0 4427
2 14781 97.8037 295.3091 0012843 24.5844 335.5972 14.69058828512194
RS-10/11
1 18129U 87 54 A 93274.02182318 .00000088 00000-0 89554-4 0 6544
2 18129 82.9289 160.4043 0012963 29.9551 330.2339 13.72323681314367
AO-13
1 19216U 88 51 B 93269.09187191 -.00000232 00000-0 65920-3 0 6457
2 19216 57.8473 292.7149 7211645 324.9411 4.2235 2.09727479 68444
FO-20
1 20480U 90 13 C 93262.12161713 -.00000010 00000-0 65198-5 0 4565
2 20480 99.0281 100.4732 0540198 233.7673 121.2342 12.83221116169367
AO-21
1 21087U 91 6 A 93271.63376897 .00000084 00000-0 82656-4 0 8605
2 21087 82.9460 336.2742 0036941 92.9638 267.5716 13.74525333133654
RS-12/13
1 21089U 91 7 A 93271.88921976 .00000014 00000-0 88052-5 0 4267
2 21089 82.9212 205.2035 0029589 113.4076 247.0196 13.74026739132768
ARSENE
1 22654U 93031B 93253.49977207 -.00000056 00000-0 10000-3 0 236
2 22654 1.2946 120.3715 2933550 152.0186 99.4287 1.42203372 1781
UO-14
1 20437U 90005B 93273.74402670 .00000039 00000-0 22866-4 0 7767
2 20437 98.6085 356.8274 0010315 231.2276 128.7984 14.29793569192514
AO-16
1 20439U 90005D 93273.73976057 .00000032 00000-0 20232-4 0 5815
```

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2 20439 98.6151 357.7986 0010489 232.0276 127.9958 14.29851668192529
DO-17
1 20440U 90005E 93273.71916563 .00000023 00000-0 16758-4 0 5831
2 20440 98.6160 358.0199 0010677 231.7721 128.2500 14.29988043192537
WO-18
1 20441U 90005F 93273.83012265 .00000031 00000-0 19837-4 0 5842
2 20441 98.6150 358.1481 0011162 231.6967 128.3213 14.29967002192559
LO-19
1 20442U 90005G 93273.75535182 .00000045 00000-0 25152-4 0 5811
2 20442 98.6159 358.2718 0011457 231.7620 128.2531 14.30058435192552
UO-22
1 21575U 91050B 93273.74550175 .00000092 00000-0 37922-4 0 2804
2 21575 98.4631 348.1156 0007889 352.8348 7.2724 14.36853144115824
KO-23
1 22077U 92 52 B 93263.67655469 .00000000 00000-0 99999-4 0 1156
2 22077 66.0792 124.2611 0001255 353.3278 6.7724 12.86279630 52121
AO-27
1 22825U 93061C 93274.12386161 -.00000103 00000-0 -33906-4 0 50
2 22825 98.6809 347.1732 0007375 241.9084 118.1352 14.27580958 727
IO-26
1 22826U 93 61 D 93272.86199979 .00000655 00000-0 28195-3 0 41
2 22826 98.6803 345.9208 0007952 245.7224 114.3082 14.27684427 538
KO-25
1 22827U 93061E 93274.12314011 .00000317 00000-0 14435-3 0 24
2 22827 98.6789 347.1689 0008256 229.1961 130.8504 14.27785690 728
PO-28
1 22829U 93 61 G 93272.52017860 .00002889 00000-0 11885-2 0 65
2 22829 98.6060 345.6230 0034766 196.6232 211.5064 14.27308199 498
NOAA-9
1 15427U 84123 A 93270.64371502 .00000096 00000-0 61218-4 0 4662
2 15427 99.0908 312.5447 0014265 238.9646 121.0126 14.13548181453256
NOAA-10
1 16969U 86 73 A 93273.05454252 .00000041 00000-0 25373-4 0 3102
2 16969 98.5172 284.9563 0014001 12.2442 347.9080 14.24833054365552
NOAA-11
1 19531U 88 89 A 93270.92231825 .00000073 00000-0 50010-4 0 2213
2 19531 99.1447 248.8132 0012208 146.2203 213.9754 14.12918124258182
MET-3/3
1 20305U 89086A 93273.86875201 .00000043 00000-0 10000-3 0 7395
2 20305 82.5458 90.3189 0014966 211.3850 148.6353 13.16023150189000
FY-1/2
1 20788U 90081A 93273.93341747 .00000177 00000-0 13993-3 0 6344
2 20788 98.8529 297.1371 0015867 19.0735 341.1022 14.01299199157382
MET-2/20
1 20826U 90086A 93273.83481420 .00000047 00000-0 36873-4 0 5869
2 20826 82.5293 352.3318 0014876 56.8293 303.4292 13.83559207151893
MET-3/4
1 21232U 91 30 A 93273.09340954 .00000043 00000-0 99999-4 0 4060
2 21232 82.5472 353.4800 0014452 113.4554 246.8089 13.16456469117126
NOAA-12
```

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1 21263U 91 32 A 93271.08767618 .00000129 00000-0 66412-4 0 6772
2 21263 98.6498 299.2850 0012033 277.9887 81.9937 14.22313745123276
MET-3/5
1 21655U 91056A 93274.04083301 .00000043 00000-0 10000-3 0 4631
2 21655 82.5537 299.7610 0014526 119.9853 240.2720 13.16823685102349
MET-2/21
1 22782U 93 55 A 93272.04890292 .00000009 00000-0 26230-5 0 178
2 22782 82.5458 53.3688 0020914 237.8672 122.0460 13.82985484 3997
MIR
1 16609U 86017 A 93273.55553133 .00007726 00000-0 93742-4 0 3285
2 16609 051.6206 050.0286 0004335 158.3682 201.8178 15.59935938435560
HUBBLE
1 20580U 90037B 93273.92510529 .00000677 00000-0 56578-4 0 1965
2 20580 28.4692 102.7442 0004582 75.3996 284.7099 14.92845272187320
GRO
1 21225U 91 27 B 93274.05553739 .00032256 00000-0 18468-3 0 26
2 21225 28.4609 243.2107 0006141 87.0457 273.0958 15.77261674 16811
UARS
1 21701U 91063B 93273.96827791 .00003301 00000-0 31171-3 0 2573
2 21701 56.9841 117.6286 0004646 96.4517 263.7045 14.96165173112137
/EX
```

234. SPACE TRIVIA LIST UPDATE - 1st of October, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-10-01 16:50:36 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Oct1.165036.13891@scorch.apana.org.au>
Source record: 28641
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

PLEASE PLEASE PLEASE POST ANYTHING YOU HAVE THAT MIGHT BE OF THE
SLIGHTEST RELEVANCE TO THIS LIST......

I'm still here everyone - don't forget me. With almost half my
workload now finished I have a little time to post this update. The items
are starting to get harder to find now, and it will be important to
prevent duplication.

I still have a lot of reading ahead of me, but the updates will
probably now come less frequently thanks to the lengths we need to go to
ensure we don't duplicate.

It's pretty much worth it.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

```
*****************************************************************************
*****************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
*****************************************************************************
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(252) Despite the complexity of the Space Shuttle Main Engines, effectively the entire engine operation is controlled by 5 valves:-
The Main Oxidizer Valve, the Main Fuel Valve, the Oxidizer Preburner Oxidizer Valve, the Fuel Preburner Oxidizer Valve, and the Chamber Coolant Valve.
[NASA - Space Shuttle News Reference.]

(253) When Johna Kepler specualted on a journey to the Moon, writing a fanciful account of a sleeping man transported to the Moon by Demons, he almost caused his mother to be executed as a witch.
[From 'Lift Off' by Michael Collins, pg 116]

(254) One critical factor in determine the stability of a Rocket Engine was it's ability to recover from a momentary abnormality and restore itself to safe, stable combustion. But how to determine this on the test stand? Clever engineers induced combustion instability by using 'bombs', explosive charges deliberately set off inside a thrust chamber to see how the engine would react to a near instantaneous disruption of smooth, controlled burning.
[From 'Lift Off' by Michael Collins, pg 124]

(255) Inside the F-1 engine, engineers used Rene 41 for part of a trubine, the same metal used on the Mercury capsule to protect the spacecraft against re-entry heating.
[From 'Lift Off' by Michael Collins, pg 125]

(256) Douglas Aircraft was unsure of what material to use to insulate the thrid stage Hydrogen Tank of the massive Saturn V Launch Vehicle. Originally they thought Balsa Wood was superior to any Man-Made material, but an analyisis of the available supply of Balsa Wood showed that every balsa tree in South America would have to be denuded to supply sufficient insulation for the Saturn fleet. Instead, polyurethane was poured into fibreglass forms to produce waffle-like tiles that were glued inside each Hydrogen tank - 43,000 tiles per tank.
[From 'Lift Off' by Michael Collins, pg 125]

(257) Once a tank was filled with Hydrogen it had to be inspected for leaks, and that was a tricky procedure. A jet of escaping hydrogen was apt to combine with oxygen in the air and burn, but in daylight the flame would be invisible. Douglas used infrared cameras on its test stands to detect any leaks, but the cameras had blind spots, so men were sent around the scaffolding, wearing protective clothing and holding brooms out in front of them. If a broom suddenly burst into flame, there was a leak!.
[From 'Lift Off' by Michael Collins, pg 126]

(258) If all the data from the Telemetry of the Saturn V were printed, it would fill 300 pages each second.
[From 'Lift Off' by Michael Collins, pg 127]

(259) The descent engine of the Apollo Lunar Module was the first throttle controlled engine to be used by a spacecraft.

[From 'Lift Off' by Michael Collins, pg 144]

(260) The Sep 16, 1993, Mir EVA overlapped with the spacewalk from Discovery for 1h 43 min; this is the first time 4 people have been spacewalking at once, and the first time American and Russian cosmonauts have spacewalked at the same time. (An earlier pair of EVAs this year, Manakov/Poleshchuk on Jun 18 and Low/Wisoff on Jun 25, were separated by only a week; otherwise there have been only three cases of Russian and American spacewalks occuring within a month of each other. The Russians made the first spacewalk but then only made one more between 1965 and 1977, by which time the Gemini, Apollo and Skylab programs were long over; then they started doing lots of EVAs from Salyut and Mir, but until this year spacewalks from the Shuttle were relatively rare.)
[from jcm@urania.harvard.edu (Jonathan McDowell)]

(261) I was a volunteer on the KC-135 Vomit Comet for medical experiments the same time that the ladies were volunteering to test the 1st Shuttle toilet in 0g. When my tests were over I went back to one of the seats in the rear of the plane and sat. Soon after, the woman who ran the experiments on me asked if I was sitting on something. Sure enough in the seat with me was a large ziplock baggie containing a clear narrow plastic funnel with tubing. This was her personal connection to the toilet. As she explained it to me she told me the prototype was called the Female Urine Collection Kit. We both agreed that the name would have to be changed before operational use.
[rlove@raptor.rmNUG.ORG (Robert B. Love)]

(262) Due to the 5psi atmosphere of Skylab, The crews of Skylab learned that - even shouting - their voices didn't carry and they were forced to use the intercom if more than 10 feet apart.
[From 'Lift Off' by Michael Collins, pg 166]

(263) The chamber of the Space Shuttle Main Engines is some 3000psi - over three times that of the Saturn V's engines.
[From 'Lift Off' by Michael Collins, pg 209]

(264) After it's first flight, Columbia was found to have over 400 nicks, scrapes and gouges in its fragile tiles.
[From 'Lift Off' by Michael Collins, pg 221]

(265) It takes more than a half a mile of welds to put a Space Shuttle External Tank together.
[National Geographic, Mar 1981, pg 332]
The precise length is 917.6m
[Space Shuttle News reference, NASA]

(266) A bolt, which attaches the Solid Rocket Booster to the External Tank, is made of a special high-grade steel which is similar in composition and design to the separation bolt of the Viking Mars orbiter and lander.
[Space Shuttle News Reference, NASA]

(267) Although no larger than the fuel cells used on the Apollo Program,
each fuel cell on the Space Shuttle has six times the output of the
Apollo fuel cells.
[Space Shuttle News Reference, NASA]

(268) Accumulated water and other fluids in the Space Shuttle Orbiter
drain out through the Limbar holes (much like limbar holes in frames
along the keel of a boat) to the lowest point for removal.
[Space Shuttle News Reference, NASA]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
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(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -

probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(Can anyone come up with some sources for backing up/refuting the last
three items?)

****

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

235. Is MIR still there?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-01 16:56:35 UTC
From: dfk@col.hp.com
Message-ID: <28hng4$om0@hp-col.col.hp.com>
Source record: 28644

I had been monitor MIR on packet on 145.550 for a week or two up
through Sept 22. Since that time I haven't heard a thing. Are they
still there, did they turn their radio off, or is my equipment broke?
(I can work local packet just fine.)

If anybody can set my mind at ease, I'd appreciate it.

Dave Kurth N0UVR
Colorado Springs, CO
dfk@col.hp.com

236. Two-Line Orbital Element Set Format

Newsgroup: rec.radio.amateur.space
Date: 1993-10-02 00:47:49 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.749522869@afit.af.mil>
Source record: 28645
Cross-posted to: rec.radio.amateur.space,rec.radio.info

As a service to the satellite user community, the following description of the NORAD two-line orbital element set format is uploaded to sci.space.news and rec.radio.info on a monthly basis. The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity. In addition, element sets (also updated daily) and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

==========

Data for each satellite consists of three lines in the following format:

```
AAAAAAAAAAA
1 NNNNNU NNNNNAAA NNNNN.NNNNNNNN +.NNNNNNNN +NNNNN-N +NNNNN-N N NNNNN
2 NNNNN NNN.NNNN NNN.NNNN NNNNNNN NNN.NNNN NNN.NNNN NN.NNNNNNNNNNNNN
```

Line 0 is a eleven-character name.

Lines 1 and 2 are the standard Two-Line Orbital Element Set Format identical to that used by NORAD and NASA. The format description is:

```
Line 1
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
10-11 International Designator (Last two digits of launch year)
12-14 International Designator (Launch number of the year)
15-17 International Designator (Piece of launch)
19-20 Epoch Year (Last two digits of year)
21-32 Epoch (Julian Day and fractional portion of the day)
34-43 First Time Derivative of the Mean Motion
or Ballistic Coefficient (Depending on ephemeris type)
45-52 Second Time Derivative of Mean Motion (decimal point assumed;
blank if N/A)
54-61 BSTAR drag term if GP4 general perturbation theory was used.
Otherwise, radiation pressure coefficient. (Decimal point assumed)
63-63 Ephemeris type
65-68 Element number
69-69 Check Sum (Modulo 10)
(Letters, blanks, periods, plus signs = 0; minus signs = 1)
```

Line 2
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
09-16 Inclination [Degrees]
18-25 Right Ascension of the Ascending Node [Degrees]
27-33 Eccentricity (decimal point assumed)
35-42 Argument of Perigee [Degrees]
44-51 Mean Anomaly [Degrees]
53-63 Mean Motion [Revs per day]
64-68 Revolution number at epoch [Revs]
69-69 Check Sum (Modulo 10)

All other columns are blank or fixed.

Example:

NOAA 6
1 11416U 86 50.28438588 0.00000140 67960-4 0 5293
2 11416 98.5105 69.3305 0012788 63.2828 296.9658 14.24899292346978

237. Two-Line Orbital Element Sets (TLE270)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-02 00:50:29 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.749523029@afit.af.mil>
Source record: 28646
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #270 -
Alouette 1
1 00424U 62 49 A 93271.69490282 .00000025 00000-0 25092-4 0 7406
2 00424 80.4680 182.9903 0024179 67.4716 292.8989 13.67781964546659
ATS 3
1 03029U 67111 A 93262.32578510 -.00000080 00000-0 99999-4 0 9799
2 03029 14.4552 10.2130 0011503 254.6292 105.2569 1.00272928 94725
Cosmos 398
1 04966U 71 16 A 93273.80250229 .00110034 30021-4 29238-3 0 4735
2 04966 51.4696 224.4722 1281546 348.5473 8.9100 13.28268625737482
Starlette
1 07646U 75010 A 93273.66197350 -.00000050 00000-0 82382-5 0 5380
2 07646 49.8261 97.4724 0206110 199.1127 160.1948 13.82184181941941
LAGEOS
1 08820U 76039 A 93270.34539619 .00000005 00000-0 99999-4 0 7020
2 08820 109.8590 45.5416 0044248 341.3368 18.5484 6.38664003150368
ETS-2
1 09852U 77014 A 93271.49999998 .00000063 00000-0 99999-4 0 7784
2 09852 11.6890 44.6370 0001985 73.6030 309.5390 1.00011263 00
GOES 2
1 10061U 77048 A 93271.23093075 .00000098 00000-0 99999-4 0 699
2 10061 10.7107 48.8690 0001351 81.8795 184.6180 1.00287485 4499
IUE
1 10637U 78012 A 93271.17186024 -.00000193 00000-0 00000+0 0 7975
2 10637 34.2092 99.1721 1308290 28.0186 250.7075 1.00285386 10107
GPS-0001
1 10684U 78020 A 93246.97185663 -.00000007 00000-0 99999-4 0 555
2 10684 64.4732 54.0241 0064458 163.2200 197.0153 1.98069722 99260
GPS-0002
1 10893U 78 47 A 93268.40867156 -.00000010 00000-0 99999-4 0 8105
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```
2 10893 63.5942 292.9056 0206838 13.7553 346.8446 2.01626861112737
GOES 3
1 10953U 78062 A 93270.28241145 .00000096 00000-0 99999-4 0 8015
2 10953 9.6254 51.5659 0006182 80.5899 159.9168 1.00280452 9092
SeaSat 1
1 10967U 78064 A 93270.70707645 .00000152 00000-0 71240-4 0 9991
2 10967 108.0109 278.9709 0002035 263.2636 96.8275 14.37873788798630
GPS-0003
1 11054U 78093 A 93270.20576275 -.00000009 00000-0 99999-4 0 9464
2 11054 63.3881 289.5167 0043448 175.0308 185.0658 1.93504937109427
Nimbus 7
1 11080U 78098 A 93269.67874324 -.00000013 00000-0 42239-5 0 1343
2 11080 99.0892 157.6553 0009593 114.1251 246.0910 13.83719669753631
GPS-0004
1 11141U 78112 A 93267.93089795 -.00000007 00000-0 99999-4 0 6279
2 11141 64.4960 54.1962 0048108 24.9639 335.2674 1.92894576107885
GPS-0005
1 11690U 80 11 A 93263.65728991 -.00000006 00000-0 99999-4 0 5720
2 11690 64.8372 55.4241 0140569 198.5037 160.9845 2.00552503114133
GPS-0006
1 11783U 80 32 A 93255.78824793 -.00000008 00000-0 99999-4 0 7755
2 11783 62.8107 287.5182 0204207 29.0570 332.1772 2.03457007 98311
GOES 5
1 12472U 81049 A 93269.51160586 .00000082 00000-0 99999-4 0 5534
2 12472 6.2736 61.0575 0004862 8.3138 351.8813 1.00218985 3128
Cosmos 1383
1 13301U 82 66 A 93272.07594042 .00000019 00000-0 15390-4 0 593
2 13301 82.9334 141.2110 0028896 93.6853 266.7610 13.68043550561720
LandSat 4
1 13367U 82 72 A 93270.74539304 .00000022 00000-0 99999-5 0 8673
2 13367 98.2157 328.4631 0007310 356.3597 3.7503 14.57112349595846
IRAS
1 13777U 83 4 A 93272.98015105 .00000161 00000-0 13435-3 0 3971
2 13777 98.9796 104.2588 0012782 319.1555 40.8651 13.99187768214844
Cosmos 1447
1 13916U 83 21 A 93271.31491328 .00000023 00000-0 17446-4 0 1406
2 13916 82.9438 205.3548 0039514 39.4709 320.9315 13.74295159527369
TDRS 1
1 13969U 83 26 B 93270.57361527 .00000120 00000-0 99999-4 0 559
2 13969 7.1798 53.8177 0001898 80.9577 267.1183 1.00276231 11423
GOES 6
1 14050U 83 41 A 93270.14790867 -.00000226 00000-0 99999-4 0 9540
2 14050 5.0630 64.1172 0002053 310.5485 329.2402 1.00262332 10151
OSCAR 10
1 14129U 83 58 B 93269.62632466 -.00000053 00000-0 99999-4 0 376
2 14129 27.3156 4.2989 6026531 117.2716 315.3887 2.05880833 49389
GPS-0008
1 14189U 83 72 A 93149.63940343 -.00000008 00000-0 99999-4 0 4679
2 14189 63.9879 54.1319 0135726 236.1393 123.3793 2.00563668 72374
LandSat 5
```

```
1 14780U 84 21 A 93273.66862415 .00000023 00000-0 99999-5 0 6731
2 14780 98.2013 333.0676 0004775 359.9648 0.1549 14.57115677509681
UoSat 2
1 14781U 84 21 B 93273.60110102 .00000181 00000-0 34679-4 0 4427
2 14781 97.8037 295.3091 0012843 24.5844 335.5972 14.69058828512194
GPS-0009
1 15039U 84 59 A 93269.47347243 -.00000010 00000-0 99999-4 0 9358
2 15039 63.8063 49.3143 0053179 216.5798 143.0575 2.00561851 68055
Cosmos 1574
1 15055U 84 62 A 93271.49456160 .00000036 00000-0 32699-4 0 3911
2 15055 82.9552 258.0215 0025937 224.7981 135.1080 13.73592308464701
GPS-0010
1 15271U 84 97 A 93272.89855496 -.00000008 00000-0 99999-4 0 5726
2 15271 62.5082 286.8348 0137851 344.8386 14.7955 2.00573525 65226
Cosmos 1602
1 15331U 84105 A 93271.20047976 .00000349 00000-0 40182-4 0 657
2 15331 82.5362 322.9843 0020892 353.1903 6.9025 14.84139967485659
NOAA 9
1 15427U 84123 A 93270.64371502 .00000096 00000-0 61218-4 0 4662
2 15427 99.0908 312.5447 0014265 238.9646 121.0126 14.13548181453256
GPS-0011
1 16129U 85 93 A 93269.64046185 -.00000008 00000-0 99999-4 0 3045
2 16129 64.5721 51.2862 0131842 141.5544 219.3958 2.00564001 4877
Mir
1 16609U 93273.23520961 .00025804 00000-0 31893-3 0 3253
2 16609 51.6218 51.6463 0003957 143.0775 217.0563 15.59940380435519
SPOT 1
1 16613U 86 19 A 93271.80388775 .00000114 00000-0 62355-4 0 2320
2 16613 98.7179 344.7279 0000695 77.3303 282.7924 14.20034943 79469
Cosmos 1766
1 16881U 86 55 A 93271.69139769 .00000339 00000-0 40063-4 0 9161
2 16881 82.5188 20.6422 0020518 13.4993 346.6785 14.83173933386692
EGP
1 16908U 86 61 A 93271.73669060 -.00000025 00000-0 99999-4 0 6662
2 16908 50.0071 168.2002 0011374 7.6807 352.4200 12.44407967324214
NOAA 10
1 16969U 86 73 A 93273.05454252 .00000041 00000-0 25373-4 0 3102
2 16969 98.5172 284.9563 0014001 12.2442 347.9080 14.24833054365552
MOS-1
1 17527U 87 18 A 93273.68380680 .00000135 00000-0 12493-3 0 6313
2 17527 99.0659 342.4066 0000801 333.7710 26.3408 13.94892597336765
GOES 7
1 17561U 87 22 A 93271.26594219 -.00000022 00000-0 99999-4 0 4055
2 17561 0.9740 78.6916 0003772 349.7556 282.1101 1.00276518 7357
Kvant-1
1 17845U 87 30 A 93271.88987966 .00007972 00000-0 99999-4 0 4388
2 17845 51.6170 58.4129 0003521 127.2948 232.7904 15.59903886370247
DMSP B5D2-3
1 18123U 87 53 A 93271.79591155 .00000059 00000-0 40132-4 0 9259
2 18123 98.7941 102.2863 0013648 204.6121 155.4408 14.15308213324032
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RS-10/11
1 18129U 87 54 A 93270.74087114 .00000088 00000-0 89554-4 0 6536
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2 18312 82.5523 59.0915 0013111 120.5395 239.7062 13.84007264308918
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GPS BII-21
1 22700U 93 42 A 93269.87901532 -.00000007 00000-0 99999-4 0 340
2 22700 54.6756 268.9284 0025085 298.1620 61.5514 2.00569494 1803
Soyuz TM-17
1 22704U 93 43 A 93271.88986922 .00006907 00000-0 87052-4 0 728
2 22704 51.6200 58.4125 0003905 130.2691 229.7675 15.59906870 13940
NOAA 13
1 22739U 93272.73778769 .00000116 00000-0 74835-4 0 440
2 22739 98.9145 213.5864 0010441 130.7623 229.4456 14.10854839 7239
ProgressM19
1 22745U 93 52 A 93271.95392326 .00000563 00000-0 99999-5 0 412
2 22745 51.6200 58.0901 0004086 130.8999 229.0786 15.59900738 7666
GPS BII-22
1 22779U 93 54 A 93271.45620497 -.00000029 00000-0 99999-4 0 281
2 22779 54.9087 327.8948 0027841 224.3656 135.4782 2.00551906 595
Meteor 2-21
1 22782U 93 55 A 93272.04890292 .00000009 00000-0 26230-5 0 178
2 22782 82.5458 53.3688 0020914 237.8672 122.0460 13.82985484 3997
UFO F2
1 22787U 93 56 A 93269.36416018 .00000101 00000-0 99999-4 0 191
2 22787 5.1008 322.7077 0154796 183.1201 176.7342 1.00250749 444
1993 056B
1 22788U 93 56 B 93273.07724256 .00036020 00000-0 14596-2 0 345
2 22788 26.9821 302.8411 5258537 223.2993 80.6180 5.28307196 1398
Cosmos 2262
1 22789U 93274.40615392 .00247421 94916-5 25702-3 0 739
2 22789 64.8880 136.0629 0079152 80.8394 280.1717 16.03815024 3837
ACTS
1 22796U 93 58 B 93267.39999998 -.00000092 00000-0 99999-4 0 108
2 22796 0.2120 241.0430 0026124 9.2900 159.5590 1.00158733 93
1993 058D
1 22797U 93 58 D 93269.83895435 -.00000097 00000-0 99999-4 0 140
2 22797 15.5747 352.0363 7470070 8.1731 359.1935 2.01101378 294
1993 050C
1 22801U 93 50 C 93270.81597196 .00001154 00000-0 66146-3 0 52
2 22801 98.9106 211.6833 0004841 97.0499 263.1210 14.11094924 6968
Cosmos 2263
1 22802U 93 59 A 93270.00685768 -.00000020 00000-0 00000+0 0 62
2 22802 71.0000 133.6397 0004056 52.5029 308.1885 14.12268242 1516
1993 059B
1 22803U 93 59 B 93272.66503490 -.00000162 00000-0 -72021-4 0 96
2 22803 70.9916 127.9018 0019731 248.0270 111.8747 14.15790249 1890
1993 059C
1 22804U 93 59 C 93267.12780412 -.00000165 00000-0 -14483-3 0 82
2 22804 70.9809 140.5548 0213635 59.8801 302.3365 13.69330621 1073
1993 059D
```

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1 22805U 93 59 D 93267.57251436 .00000194 00000-0 22720-3 0 118
2 22805 70.9776 139.6819 0216274 83.8487 278.7227 13.68244297 1138
1993 059E
1 22806U 93 59 E 93266.67964796 .00000046 00000-0 60522-4 0 95
2 22806 71.0214 141.9294 0203135 62.4803 299.6777 13.71171277 1018
1993 059F
1 22807U 93 59 F 93262.67037124 -.00000135 00000-0 -11514-3 0 73
2 22807 71.0251 149.7540 0208944 91.3276 271.1767 13.69871507 460
Cosmos 2264
1 22808U 93274.39098556 -.00005887 00000-0 -94407-4 0 551
2 22808 65.0261 353.1738 0011359 273.3745 86.6100 15.52064763 2228
1993 061A
1 22823U 93271.25232359 .00002611 00000-0 11885-2 0 64
2 22823 98.6829 344.3197 0001435 116.8281 234.5048 14.22449351 317
1993 061B
1 22824U 93 61 B 93272.58311756 -.00000747 00000-0 -29839-3 0 36
2 22824 98.6852 345.6489 0005198 244.1688 115.9049 14.27090659 500
1993 061C
1 22825U 93 61 C 93272.44174106 -.00000264 00000-0 -99122-4 0 46
2 22825 98.6813 345.5037 0007327 248.1905 111.8494 14.27580455 482
1993 061D
1 22826U 93 61 D 93272.86199979 .00000655 00000-0 28195-3 0 41
2 22826 98.6803 345.9208 0007952 245.7224 114.3082 14.27684427 538
1993 061E
1 22827U 93 61 E 93273.91290540 .00000025 00000-0 18021-4 0 22
2 22827 98.6789 346.9606 0008250 229.7481 130.2983 14.27784636 680
1993 061F
1 22828U 93 61 F 93272.37067678 -.00001528 00000-0 -61091-3 0 32
2 22828 98.6799 345.4264 0007175 242.4102 115.0288 14.27785657 473
1993 061G
1 22829U 93 61 G 93272.52017860 .00002889 00000-0 11885-2 0 65
2 22829 98.6060 345.6230 0034766 196.6232 211.5064 14.27308199 498
1993 061H
1 22830U 93 61 H 93272.23039006 .00022030 00000-0 88551-2 0 32
2 22830 98.5787 345.3042 0011082 215.5241 143.7824 14.28031786 452
1993 062B
1 22837U 93 62 B 93273.95000173 .00743129 58530-4 14999-3 0 11
2 22837 51.6493 274.0817 0002066 197.5209 162.8718 16.30679106 44
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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238. ANS-275 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-10-03 04:58:28 UTC
From: cowdin@pogo.DEn.mmc.COM
Message-ID: <$ans-275.01@ampr.org>
Source record: 28648
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-275.01
NEW CROP OF OSCARS ARE BORN!

HR AMSAT NEWS SERVICE BULLETIN 275.01 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.01

A New "Crop" of OSCARs On-Orbit

As a result of last week's successful launch of SPOT-3 on ARIANE mission V-59, (26-SEP-93 01:45 UTC) three, and possibly four, amateur radio satellites have been "born." Late this week, two were given the names ITAMSAT-OSCAR 26 and AMRAD-OSCAR 27. The Portugese builders of POSAT are determining whether or not they will activate the amateur package on that otherwise commercial satellite. This is why there maybe three, or perhaps four amateur satellites. The AMSAT News Service (ANS) will carry additional information when available. At the time this bulletin went to press, the Korean builders of KITSAT-B have not yet designated it an OSCAR, although it is expected that they will do so shortly.

These new series of amateur radio satellites will ensure that radio amateurs will have reliable "store-and-forward" messaging capability for many years to come. Also, the imaging cameras on POSAT-1, if it is made available to amateurs, and KITSAT-B will provide many excellent images of the earth. To date, there has been no "official" announcement about the release of these satellites for general use. Each of the groups involved with the operation of their respective satellite are currently performing "engineering" check-outs. Please watch in the ANS bulletins for an announcement of the commencement of general amateur radio operations on each of these satellites.

The following table is a summary of the frequencies of each of these new spacecraft.

UPLINK DOWNLINK BAUD
==========
KITSAT-B 145.870 MHz 435.175 MHz 9600
145.980 MHz 436.500 MHz 9600

ITAMSAT-OSCAR-26 (IO-26) 145.875 MHz 435.867 MHz 1200/9600
145.900 MHz 435.822 MHz
145.925 MHz
145.950 MHz

AMRAD-OSCAR-27 (AO-27) 145.850 MHz 436.800 MHz 300-9600

POSAT-1 145.925 MHz 435.250 MHz 9600
145.975 MHz 435.275 MHz

/EX
SB SAT @ AMSAT $ANS-275.02
MORE INFO ABOUT AMRAD-OSCAR-27

HR AMSAT NEWS SERVICE BULLETIN 275.02 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.02

AMRAD Announces the Launch of AMRAD-OSCAR-27 (AO-27)

The Amateur Radio Research And Development Corporation (AMRAD) of McLean Virginia is proud to announce the launch and activation of a new Orbiting Satellite Carrying Amateur Radio (OSCAR) named AMRAD-OSCAR-27 (AO-27). Launch occurred at 01:45:00 UTC Sunday, 26-SEP-93 aboard the Ariane V-59 mission from the Guyana Space Center in Kourou, French Guiana. AO-27 was inserted into its orbit approximately 24 minutes later as one of seven satellites launched on this mission. AO-27 was activated on the next orbit as it passed over the command station near Washington, D.C., and was heard by AMRAD members throughout the area.

AO-27 is a secondary amateur communications payload carried aboard the EYESAT-1 commercial MICROSAT satellite built by Interferometrics Inc. of Vienna, Virginia. The amateur equipment aboard the satellite was constructed by members of AMRAD, a technically-oriented, non-profit organization of radio amateurs based in the Virginia suburbs of Washington, D.C., to meet the needs of amateurs for a platform to conduct digital satellite communications experiments. The payload is presently transmitting at 1200 bps AFSK on a frequency of 436.800 MHz on a part-time schedule during the on-orbit checkout and commissioning of the parent EYESAT-1 satellite. AMRAD members will be preparing information for future release on receiving and decoding telemetry from the payload and on the progress of their experiments.

AMRAD congratulates the KITSAT and ITAMSAT teams and the University of Surrey on the launch and activation of their satellites. AMRAD thanks AMSAT-NA for the technical support and encouragement they provided during construction and preparation of the AMRAD OSCAR payload. For further information about AMRAD and the AMRAD OSCAR-27 payload, please contact AMRAD at PO Drawer 6148, McLean Virginia, USA, 22106-6148, or call the AMRAD BBS in McLean, Virginia, at (703) 734-1387.

/EX
SB SAT @ AMSAT $ANS-275.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 275.03 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

9-Oct-93 1500 B 101 W9ODI N7NQM
23-Oct-93 1315 B 154 WB6LLO WA5ZIB
30-Oct-93 1300 B 62 W5IU WB6LLO

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-275.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 275.04 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.04

Weekly OSCAR Status Reports: 01-OCT-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 25-Oct 25
Mode-B : MA 0 to MA 90 !
Mode-BS : MA 90 to MA 120 !
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Blon/Blat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, Oct 25
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: KO-23 had an OBC crash earlier in the week and, while the KAIST Ground Controllers were working with their new satellite (KO-25) they had to cope with this bird's failure too. There was some difficulty in gaining control of the bird again, and in the process the RAM disk was lost. However, the BBS is now up and running and busy as usual. [WH6I]

IO-26: This new satellite has been heard and is sending some frames. WH6I has seen telemetry coming down at 1200 baud PSK format similar to that of AO-16. [WH6I]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX
SB SAT @ AMSAT $ANS-275.05
AMSAT-NA SPACE SYMPOSIUM INFO

HR AMSAT NEWS SERVICE BULLETIN 275.05 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.05

AMSAT-NA Space Symposium Set For 7-11 OCT In Arlington, TX

Arrangements are being finalized for the AMSAT-NA Annual Meeting and Space Symposium '93. The proceedings are at the printers and the speakers list is full (30 Speakers!). The Saturday evening Banquet Program has now been arranged and will be very entertaining. There is still time to register. Call AMSAT Headquarters at (301)589-6062 for registration. Pre-registration deadline is 1-OCT-93. Hotel reservations can be made at (800) 453-7909 or (817) 640-4142. Be sure to mention you are with AMSAT.

If you are coming to the Surplus Store Tour on 7 October, please be sure to indicate this. If you are driving to Arlington and can help provide transportation for Thursday and/or Friday evening please so indicate.

This promises to be one of the best Symposiums yet so don't miss it. See you in Arlington, TX, 7-10 October 93!

Keith Pugh, W5IU

/EX
SB SAT @ AMSAT $ANS-275.06
ANS LANDLINE BBS

HR AMSAT NEWS SERVICE BULLETIN 275.06 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.06

Some Landline BBSs That Carry AMSAT News Service (ANS) Bulletins & KEPS

CompuServe's Hamnet
Sysop: Scott Loftness (W3VS)
<760703.407@CompuServe.COM>

Western Pacific BBS
Phone #: 415-453-2854
Up to 14,400bps V.32bis
Sysop: Daniel C. Dufficy (KH8AF)
>INTERNET:kh8af@crl.com

The ARRL BBS
Phone #: 203-666-0578
Sysop: Luck Hurder (KY1T)
>INTERNET:lhurder@arrl.org

California Amatuer Radio Emergency Services (CARES) BBS
Phone #: 916-323-4826
Sacramento, CA
Sysop: Gorden Fuller (WB6OVH)
>INTERNET:GFULLER@SFOVMICI.VNET.IBM.COM

!!amsa@sats&stats!! bbs
Phone #: 201-261-2780
New Jersy
Up to 14,400bps
Sysop: Mel Roman (KA2UPD)
>INTERNET:70712.1050@CompuServe.COM

HAM>LINK<RBBS
Phone #: 612-426-0000
Minnesota
Up to 9600bps
Sysop: John Desmond (K0TG)
>INTERNET:k0tg@amsat.org

OCA/AMSAT BBS
Phone #: 714-738-4331
Fullerton, CA
UP to 14,400bps
Sysop: John Wisniowski (N6DBF)
>INTERNET:n6dbf@amsat.org
or at CompuServe 70233,75

DRIG/AMSAT BBS
Phone #: 214-394-7438
Dallas, TX
UP to 14,400bps

Sysop: Jeff Wallach (N5ITD)

If you have a BBS and would like to join the AMSAT BBS Network, N6DBF would like to hear from you. I need to know the name of your BBS, Phone number, Location (city, state), Baud rate, Sysop's name and callsign, and your INTERNET and/or CompuServe address. Also, what AMSAT, ARRL, etc. files do you post each week.
Contact:
CompuServe at: 70233,75
Internet at: >INTERNET:n6dbf@amsat.org
or at N6DBF's callbook address

* Please note: The AMSAT BBS Network is a telephone (BBS) network, not a packet (PBBS) network.

73, John Wisniowski (N6DBF)
AMSAT NA, BBS Coordinator

/EX
SB SAT @ AMSAT $ANS-275.07
G3IOR REPORTS ABOUT RS & MIR

HR AMSAT NEWS SERVICE BULLETIN 275.07 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 1, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-275.07

G3IOR Provides Some Interesting News About RS-10/11, RS-12/13 & MIR

The Russian RS-1 satellite, launched in October 1978 is now 15 years old, but still giving signals. It's battery went open circuit soon after launch, but the spacecraft's 29.401 MHz beacon can still be heard sending "55" when the solar cells are in full sunlight. Sadly, the power is insufficient to provide that needed to operate the Mode-A transponder.

Nico Janssen (PA0DLO) recently visited the Radio Sputnik ground command station, meeting Leonid Labutin (UA3CR), his son Evgeny (RA3APR), Sergei Samburov (RV3DR), and the operators of RS3A. They passed on the following information on the satellites.

For a number of technical reasons, command problems, interference and the like, the radio amateur satellite systems RS 10/11 and RS 12/13 cannot presently be switched to modes other than those now in use. Consequently for the immediate future RS-10 may be expected to continue to operate in Mode-A (2M uplink and 10M downlink) and RS-12 in Mode-K (15M uplink and 10M downlink). RS-11 and RS-13 will remain switched off and in "standby" mode. The new Russian amateur satellite system RS-15 is now complete and ready for launch. It will be built into another Cosmos navigation satellite, similar to the navigation satellite Cosmos-2123 that houses RS-12/13. It is not known exactly when the launch of the satellite will occur, but as soon as an older satellite in this series of navigation satellites reaches the end of its operational life, the new satellite, with RS-15, will be launched.

There are now no plans for any further RS satellites after RS-15, and only project that the RS team is involved in is the voice experiment satellite VOXSAT. In this project the Russian team will work together with AMSAT-LU to build this amateur satellite system also to be built into a Russian satellite.

News on MIR

The present crew members of MIR, Vasily Tsibliyev and Aleksander Serebrov do not have personal amateur radio licenses, thus they do not have their own call signs while manning MIR. However, they do have permission to use the amateur radio station in MIR, using the general MIR call sign R0MIR for speech and R0MIR-1 for the onboard packet radio Personal Message System (PMS).

Since all Russian cosmonauts will now be given amateur radio training by Sergei (RV3DR) as a fixed part of their cosmonaut training, we may confidently expect the amateur radio station in MIR to be active continuously as long as cosmonauts are on board the space station. Future trained cosmonauts include Valeri Poliakov (U3MIR), Viktor Afanasyev (U9MIR) and Yuri Usachov (R3MIR).

Sergei (RV3DR) is only involved in training the Russian cosmonauts, so he recommends that western amateur radio organizations take care of the amateur radio training of the coming visiting cosmonauts preparing for a stay in MIR. Also, to make the amateur radio activity of a western cosmonaut in MIR as effective as possible Sergei suggests to have the cosmonaut carry out a specific amateur experiment or take some new equipment to MIR, such as the microphone with voice memory taken by the German cosmonaut Flade.

Plans are afoot to change MIR's amateur radio equipment. In the future not only 2M but also 70cm and even 23cm operation can be expected. ATV equipment for use aboard the space station is presently being developed in Germany.
73, Pat, G3IOR @ GB7VLS

/EX

239. Help with AO-21, please...

Newsgroup: rec.radio.amateur.space
Date: 1993-10-03 07:41:58 UTC
From: andrews@fms.com
Message-ID: <CEB9Dy.5u1@fms.com>
Source record: 28649

Hello, I need the latest Kep's for AO-21, I can hear it loud and
clear whenever it makes a pass, I'm trying to build a 50-100w xmiter
for the uplink freq for moble use.

Could some body please send me the Kep's so I can figure out when the
bird is going to come over (no, I don't have a tracking program)?
-or-
Send me a printout of AO-21 for Cleveland for the next 30 days?

Thanks much...

--
Tell Me Something I Don't Know, ! HAM = N8OFS
Show Me Something I Can Use, ! ARMY MARS = AAN5HJT
Push The Buttons, ! CB = THE NEON KNIGHT
Connect The God-Damn Dots!!! - Ministry ! HACKER = TH3 N30N KN1GHt

240. SETI: Public Lecture (final announ.)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-04 01:38:03 UTC
From: abdilla@rmit.edu.au
Message-ID: <abdilla-041093114720@icarus.edc.rmit.oz.au>
Source record: 28650

Don't forget to come along to the SETI talk this THURSDAY!!!
Bring your friends - tickets at door i.e. no bookings

Below is a brief resume of the guest speaker

****
SETI:SETI:SETI:SETI:SETI:SETI:SETI:SETI
****

Is there anyone out there?

The Search For Extraterrestrial Intelligence

A PUBLIC LECTURE

Dr. Guillermo Lemarchand
(Argentine Institute for Radio Astronomy)

-Physicist at the University of Buenos Aires
-Organizer of the First Latin-American Meeting on Intelligent Life in the Universe (1985)
-Member of the SETI Research group at the Argentine Institute for Radioastronomy since 1986.
-Researcher at the Center for Advanced Studies of the University of Buenos Aires
-Visiting Fellow at the Center of Radiophysics and Space Research of Cornell University, under supervision of Carl Sagan (1992)
-Editor of BIOASTRONOMY NEWS, newsletter of the International Astronomical Union Commission 51 (Bioastronomy), published by The Planetary Society.

8 p.m.
Thursday, October 7
Glasshouse Theatre, RMIT
360 Swanston Street, Melbourne

Admission: $3 (tickets at door - no bookings available)

Organised by the Space Association of Australia, Inc.

USUAL DISCLAIMER: This event is not sponsored by either RMIT or the Centre for Design at RMIT

+----------
Michael Abdilla - Information Services Manager
Centre for Design at RMIT

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241. Equipment for VHF/UHF work

Newsgroup: rec.radio.amateur.space
Date: 1993-10-05 15:29:40 UTC
From: wa2sff@cbnewsh.cb.att.com
Message-ID: <CEFKDL.Bnl@cbnewsh.cb.att.com>
Source record: 28651
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.equipment

I want to get on 2m-23cm with CW, SSB and FM.
I want to use the radio for terrestrial work and for satellite work.

I would like to other hams experience and thoughts on
the best way to accomplish this goal.

The options I am considering are:

1A: Use one (existing) HF transceiver with transverters.
1B: Use two (existing and new) HF transceivers with transverters.
2A: Buy Yasau 736
2B: Buy Kenwood 790
2C: Buy ICOM 970

I have been told for satellite work I need to transmit and receive
at the same time. Is this true and how important is it?

If I don't need to transmit and receive at the same time, I will go
with option 1A. It is the cheapest solution.

If I go with option 1B and buy a new HF radio and use transverters,
what would be a good rig? My current Kenwood 690 requires
modification for use with transverters. Most ads don't talk
about support for transverters.

If I need to monitor while transmitting,
would I do better by going with option 2
rather than buying a second HF radio and adding transverters?

If I go with option 2, which radio is best?

I like the Yasau 736 since it covers 144/222/432/1296 in one box.
It is also the cheapest of the three.
It will transmit and receive at the same time but it will only display
the frequency of either the transmitter or the receiver but not both.

The Kenwood is close to the Yasau in price and the ICOM is
significantly more expensive.

Which is better the Kenwood or the Yasau?

Why would I buy an ICOM over the Yasau or Kenwood?

Joe Wilkes
WA2SFF
j.e.wilkes@att.com

242. Re: Equipment for VHF/UHF work

Newsgroup: rec.radio.amateur.space
Date: 1993-10-05 16:22:45 UTC
From: "F. Kevin Feeney" <fkf1@cornell.edu>
Message-ID: <28s70lINNbrh@newsstand.cit.cornell.edu>
Source record: 28652
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.equipment

In article <CEFKDL.BnI@cbnewsh.cb.att.com> joseph.e.wilkes,
wa2sff@cbnewsh.cb.att.com writes:
>I have been told for satellite work I need to transmit and receive
>at the same time. Is this true and how important is it?

It may not be absolutely necessary, especially on Rs12/13 (hf bird)
but for all practical purposes it will be required. With doppler
shift and all it's about the only way to tell that you aren't
qrming someone else, and to verify how well you are
making it in.

>If I go with option 1B and buy a new HF radio and use transverters,
>what would be a good rig? My current Kenwood 690 requires
>modification for use with transverters. Most ads don't talk
>about support for transverters.

Don't know about this - I went route 2.
>
>If I need to monitor while transmitting,
>would I do better by going with option 2
>rather than buying a second HF radio and adding transverters?

I think so.
>
>If I go with option 2, which radio is best?
>

The 736 is the most popular on Oscar 13. It's what I went with.
It has a good receiver, enough power to do cw and some
ssb on AO13 barefoot with good antennas, and nice
features.

>I like the Yasau 736 since it covers 144/222/432/1296 in one box.
>It is also the cheapest of the three.
>It will transmit and receive at the same time but it will only display
>the frequency of either the transmitter or the receiver but not both.

Which isn't much of a problem - it might be nice to see both
at once, but you pretty much set the receive, then tune
the transmit by listening (once you get close). You can flip
back and forth easily.
>
>The Kenwood is close to the Yasau in price and the ICOM is
>significantly more expensive.
>

>Which is better the Kenwood or the Yasau?
>

Yaesu - the kenwood is klunky to use I hear and Gary says it has real thermal problems. I hear very few of them on. The ICOM is a lot more expensive, and doesn't seem to be all that well thought out for satellite work from what I hear. The extended rx module looks nice though.

I don't know what satellites you are planning to use. For the microsats, you will need a tnc and a special modem and probably have to do minor surgery (if you want to do 9600 baud) on the rig for direct fm. The 736 has the most data on these kinds of mods because it is so popular.

For Oscar 13 you will need high gain antennas (at least 10 db on each band) and will rapidly want a good antenna mounted preamp and probably a power amp. I worked mode B for about 6 months without either, and it worked and was fun. But the addition of an ARR gasfet preamp at the antenna made a big difference in how well I could hear. The power amp made it possible to use the satellite for longer durations during a pass (at worse squint angles).

Have fun.

73 de Kevin, WB2EMS

243. AMRAD Announces the Launch of AMRAD OSCAR-27

Newsgroup: rec.radio.amateur.space
Date: 1993-10-06 02:12:17 UTC
From: marcbg@feenix.metronet.com
Message-ID: <CEGE4I.DCB@feenix.metronet.com>
Source record: 28653
Cross-posted to: rec.radio.info,rec.radio.amateur.space

AMRAD Announces the Launch of AMRAD OSCAR-27

The Amateur Radio Research And Development Corporation (AMRAD),
of McLean Virginia, is proud to announce the launch and activation of
a new Orbiting Satellite Carrying Amateur Radio (OSCAR), named
AMRAD OSCAR 27 (AO-27). Launch occurred at 0145 UTC Sunday, 26
September aboard the Ariane V.59 mission from the Guyanis
Space Center in Kourou, French Guiana. AMRAD OSCAR-27 was
inserted into its orbit approximately 24 minutes later as one of
seven satellites launched on this mission. AMRAD OSCAR-27 was
activated on the next orbit as it passed over the command station
near Washington, D.C., and was heard by AMRAD members throughout
the area.

AMRAD OSCAR-27 is a secondary amateur communications payload
carried aboard the EYESAT-1 commercial microsatellite built by
Interferometrics Inc. of Vienna, Virginia. The amateur equipment
aboard the satellite was constructed by members of AMRAD, a
technically-oriented, non-profit organization of radio amateurs
based in the Virginia suburbs of Washington, D.C., to meet the needs
of amateurs for a platform to conduct digital satellite
communications experiments. The payload is presently transmitting
at 1200 bps AFSK on a frequency of 436.8 MHz on a part-time
schedule during the on-orbit checkout and commissioning of the
parent EYESAT-1 satellite. AMRAD members will be preparing
information for future release on receiving and decoding telemetry
from the payload and on the progress of their experiments.

AMRAD congratulates the KITSAT and ITAMSAT teams and the
University of Surrey on the launch and activation of their satellites.
AMRAD thanks AMSAT-NA for the technical support and encouragement they
provided during construction and preparation of the AMRAD OSCAR payload.
For further information about AMRAD and the AMRAD OSCAR-27 payload,
please contact AMRAD at PO Drawer 6148, McLean Virginia, USA, 22106-6148,
or call the AMRAD BBS in McLean, Virginia, at (703)734-1387.

--
/ Marc Grant N5MEI / marcbg@metronet.com / Live from Texas. Home of
/ POB 850472 / marcbg@esy.com / da Barbecue, da Beer, and
/ Richardson, TX 75085 / 214-231-3998 (voice) / da Boys. Dat's dat.
/ / 214-231-0025 (fax) /

244. Satellite Help

Newsgroup: rec.radio.amateur.space
Date: 1993-10-06 10:52:11 UTC
From: fax%sparc4@Olivetti.COM
Message-ID: <9310061052.AA00650@sparc4.ICO.OLIVETTI.COM>
Source record: 28654

Hi,
I wish to move the first steps in satellite work without having to setup
a special station but using my hf rig to rx in the 10mt band and uplinking
on 2meters.

I'v been told that the easier sats to work with this "recycled" setup are
the RS series. Now, I know how to find the keplerian elements and
the up/downlink freqs for the sats of interest but I still need a program that
can tell me basically when should I turn my rig on.

I already have InstantTrack but i can't get it to work because it says it
needs the rotator control hardware. I'm almost sure I'm missing something
and I'd be glad to have some directions in case this is the right package.

Anyway, also having a pointer (ftp site) to a simpler software (possibly
runnable on poor adapters like CGA, HGC) that shows the passing times
and az/el coordinates would be very fine.

Thanks, Marco

Marco Fassiotto - IX1IIY/1 |
System Software Engineer |
P.O. Box 19 | Packet : ix1iiy@ik1brm.iv.to.ita.eu
10018 Pavone (TO) - ITALY | INTERNET : fax@sparc4.ico.olivetti.com
---

245. ANS-279 Bulletins

Newsgroup: rec.radio.amateur.space
Date: 1993-10-06 23:54:12 UTC
From: cowdin@pogo.den.mmc.com
Message-ID: <$ans-279.01@ampr.org>
Source record: 28655
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-279.01
PHASE-3D MACHINIST NEEDED

HR AMSAT NEWS SERVICE BULLETIN 279.01 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.01

WD4FAB NEEDS A FEW GOOD MACHINIST FOR PHASE-3D

Dick Jansson (WD4FAB), AMSAT VP Engineering, has asked the AMSAT News Service (ANS) to post an additional request for machinist help on the Phase-3D project. As many of you know, several machinist volunteers have already stepped forward in the past to assist with the project, and many have produced some very high quality materials.

Right now, however, Dick has an additional and urgent need for a machinist volunteer with access to a numerically controlled (NC) lathe and who can also produce modest quantities of small aluminium inserts for honeycomb panels. These inserts will be used in manufacturing Phase-3D's solar arrays.

Anyone with these capabilities and who would like to volunteer should contact Dick Jansson directly via INTERNET at "wd4fab@amsat.org" or you can fax him at (407) 644-9872.

Dick Daniels
AMSAT-NA Phase-3D Project Manager

/EX
SB SAT @ AMSAT $ANS-279.02
KITSAT-B BECOMES KITSAT-OSCAR-25

HR AMSAT NEWS SERVICE BULLETIN 279.02 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.02

SaTReC & KAIST Announces the Launch of KITSAT-OSCAR-25 (KO-25)

The Satellite Technology Research Center(SaTReC) at the Korean Advanced Institute of Space Tecnology (KAIST), announced the successful launch and activation of new OSCAR. KITSAT-2 was built at KAIST and is named as KITSAT-OSCAR-25 (KO-25) following the suggestions from AMSAT group. KO-25 was launched by ARIANE launcher at 01:45 UTC on 26-SEP-93 from Kourou Space Center of French Guyana. KO-25 was inserted into orbit after 23 minutes.

KO-25 was activated 12:03 UTC on the same day from the Central Command Groundstation at SaTReC at KAIST. KO-25 carries five payloads onboard such as CCD Earth Imager, Store-and-Forward mailer, Digital Signal Processing Experiment for High Speed Modem tests, Infra-Red Sensor Experiment (IREX), Low energy electron detector (LEED) and it also has new computer system called KASCOM (KAIST Satellite Computer) for small satellite.

SaTReC sincerely express gratitude on the help that AMSAT members have given to us during our initial operation. Special thanks to W3XO, WD0E, Harold Price, G0/K8KA, Eric A. Cottrell, Steve Greene, DB2OS, N3FKV, Ron Parise, W3IWI and whom were active on the INTERNET during the period.

SaTReC congratulates the AMRAD and ITAMSAT teams, and the University of Surrey, on the launch and activation of their satellites. For further information about SaTReC and the KO-25 payloads, please contact SaTReC via:

Tel: 82-42-869-8614
Fax: 82-42-861-0064
INTERNET: hskim@satrec.kaist.ac.kr

/EX
SB SAT @ AMSAT $ANS-279.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 279.03 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

23-Oct-93 1315 B 154 WB6LLO WA5ZIB
30-Oct-93 1300 B 62 W5IU WB6LLO
13-Nov-93 1230 B 146 VE2LVC W5IU

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-279.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 279.04 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.04

Weekly OSCAR Status Reports: 01-OCT-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 25-Oct 25
Mode-B : MA 0 to MA 90 !
Mode-BS : MA 90 to MA 120 !
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Blon/Blat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, Oct 25
Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, etc., and can also be found in many international newsletters. [G3RUH/DB2OS/VK5AGR]

KO-25: KO-25 has deployed its gravity gradient boom and is operating nominally. On 4-OCT-93 2:10 UTC Attitude Determination and Control System (ADCS) engineers concluded that the spinning rate of KO-25 had been reduced enough and they started preparation operation for boom deployment. At 3:56 UTC the same day, boom was successfully deployed which was proven by tel-emetry. After the deployment, KO-25 was confirmed to have an attitude which the bottom of the spacecraft looking down the Earth. After some upgrading work on command groundstation, receiving quality has improved and we are now having excellent contact to our bird. No fading is experienced since then. While ADCS team concentrates on their work, payload teams are preparing for their first test procedures. The V59-H is still showing best matching than any others so that we continue to use. [Hyngshin Kim, hskim@satrec.kaist.ac.kr]

POSAT-1: Attitude control operations and camera checkout continue on PoSAT-1. This evening, Monday, 4-OCT-93, a modified gravity-gradient-lock program was loaded to the 80C186 OBC. It is hoped that this modified algorithm will remove the preference toward upside down lock which has thus far effected the ADCS operations. Previously, the decision when to initiate the gravity capture sequence has been taken manually from the control station. The present experiments are aimed at commissioning a fully-automatic software package. If this effort is not successful in the next few days, the previous, manual operation will be executed. [G0/K8KA]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX
SB SAT @ AMSAT $ANS-279.05
AMSAT-NA SPACE SYMPOSIUM INFO

HR AMSAT NEWS SERVICE BULLETIN 279.05 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.05

AMSAT-NA Space Symposium Set For 7-11 OCT In Arlington, TX

Arrangements have been finalized for the AMSAT-NA Annual Meeting and Space Symposium '93. The proceedings are at the printers and the speakers list is full (30 Speakers!). The Saturday evening Banquet Program has now been arranged and will be very entertaining. Even if you have not registered, YOU ARE STILL INVITED! JUST SHOW UP AT THE QUINTA INN LOCATED IN ARLING-TON, TX AND REGISTER ON THE SPOT! The Talk-In frequency is 147.140 (+600 KHz). This promises to be one of the best Symposiums yet so don't miss it. See you in Arlington, TX, 8-10 October '93!

Keith Pugh, W5IU

/EX
SB SAT @ AMSAT $ANS-279.06
CALL FOR AMSAT AC

HR AMSAT NEWS SERVICE BULLETIN 279.06 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.06

AMSAT Needs Area Coordinators (AC)

Area Coordinators (AC) are needed in all parts of the country as part of an effort to increase the visibility of AMSAT's existing satellite operations and Phase-3D developments. AC are the essential interface between AMSAT and the local radio amateur population. Area Coordinators are volunteers whose activities may include AMSAT booths at hamfests, local AMSAT nets, presentations to local clubs in addition individual "Elmering". AC thru their activities increase awareness of the radio amateur satellite program in addition tpromoting AMSAT membership and fundraising for Phase IIID.

If you might be interested in becomming an Area Coordinator and providing invaluable service both to AMSAT and the "hams" in your community please

contact Larry Brown (NW7N) or the AMSAT office, (301) 589-6062. Or E-mail to NW7N your current address and he will return some additional information on the AC position. NW7N would also be interested in answering your questions or discusing this activity either by phone or E-mail. He will also be at the Annual Meeting in Arlington and hopes to see you there.

Larry Brown (NW7N) can be reached in the following ways:

Internet: nw7n@amsat.org
Phone: (602) 886-1957 (evenings)

/EX
SB SAT @ AMSAT $ANS-279.07
NEW AO-13 ZRO SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 279.07 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-279.07

WA5ZIB Presents A New AO-13 ZRO Test Schedule: All Are Invited

The ZRO tests of September 26th and October 2nd went very well. Noise levels both here and in Europe were very low and several stations reported hearing and copying the code groups at new levels. New "Z9 Club" entries are expected based on the conversations with test participants. One test remains this season on Monday, 18-OCT-93 at 04:30 UTC. For those in North America this is late on Sunday night, the 17th. The ZRO tests are held on 145.840 MHz at 10 words-per-minute. The signal strength at level "zero" is set to match the general telemetry beacon, while level "9" is 27 dB lower. Level "A" at 30 dB down is now being sent as a regular part of each run. All listener reports with date of test and numbers copied should be sent to Andy MacAllister (WA5ZIB), AMSAT V.P. of User Operations, 14714 Knights Way Drive, Houston, TX 77083. A report will be returned verifying the level of accurate reception.

/EX

246. Re: Satellite Help

Newsgroup: rec.radio.amateur.space
Date: 1993-10-07 13:01:13 UTC
From: stephens@geod.emr.ca
Message-ID: <stephens.749998873@ngis>
Source record: 28656

fax%sparc4@Olivetti.COM (Marco Fassiotto) writes:

>Hi,
>I wish to move the first steps in satellite work without having to setup
>a special station but using my hf rig to rx in the 10mt band and uplinking
>on 2meters.

>I'v been told that the easier sats to work with this "recycled" setup are
>the RS series. Now, I know how to find the keplerian elements and
>the up/downlink freqs for the sats of interest but I still need a program that
>can tell me basically when should I turn my rig on.

>I already have InstantTrack but i can't get it to work because it says it
>needs the rotator control hardware. I'm almost sure I'm missing something
>and I'd be glad to have some directions in case this is the right package.

>Anyway, also having a pointer (ftp site) to a simpler software (possibly
>runnable on poor adapters like CGA, HGC) that shows the passing times
>and az/el coordinates would be very fine.

>Thanks, Marco

For general purpose use there are three programs I would recommend.
Traksat, PCtrack and USAT92B. The first two are shareware, the other
is freeware (I think) . Find them on a SIMTEL mirror (e.e. oak. oakland.edu)
under pub/msdos/satellite. You will need two line elements (PCT also
takes ARRL elements). USAT includes a quick basic source list.
The program names are TRAK280.zip PCT214a.ZIP and USAT92b.zip.
Instant Trak can be purchased from AMSAT.

73 VE3PYG

--
Dave Stephenson
Geological Survey of Canada
Ottawa, Ontario, Canada *Om Mani Padme Hum 1-2-3*
Internet: stephens@geod.emr.ca

247. Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-07 17:54:40 UTC
From: ae517@Freenet.carleton.ca
Message-ID: <CEJGF4.HFr@freenet.carleton.ca>
Source record: 28657

I saw a brief construction article on the Lindenblad antenna for 137MHz
using folded dipoles placed inside PVC tubing. The author does not
described the method used to connect the 4 feedlines together, referencing
past construction articles, which I assume provided these details.

Should all four dipoles be fed in phase?

Has anyone on this newgroup actually built a Lindenblad. How well does it
work for LEO satellites, such as the APT birds or digital hamsats?

Any info would be appreciated.

73 de ve3uav/aa8lu

--

248. Re: Satellite Help

Newsgroup: rec.radio.amateur.space
Date: 1993-10-07 23:36:58 UTC
From: greg@core.rose.hp.com
Message-ID: <CEJw9M.DAI@icon.rose.hp.com>
Source record: 28658

Marco,

Mentioning "rotor control hardware" makes me think the program is configured to talk to an antenna mover. I've made lots of contacts through RS-10 with a simple vertical uplink antenna (5/8 Jpole) and a long wire antenna for the downlink. No antenna rotors needed.

Greg KD6KGW

249. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 00:56:10 UTC
From: bwalzer@muug.mb.ca
Message-ID: <1993Oct8.005610.16062@muug.mb.ca>
Source record: 28659

In <CEJGF4.HFr@freenet.carleton.ca> ae517@Freenet.carleton.ca (Russ Renaud) writes:

>I saw a brief construction article on the Lindenblad antenna for 137MHz
>using folded dipoles placed inside PVC tubing. The author does not
>described the method used to connect the 4 feedlines together, referencing
>past construction articles, which I assume provided these details.

>Should all four dipoles be fed in phase?

Yes. The one I made just had you parallel 4 hunks of 300 ohm twinlead and
had you attach the resulting mess to a bnc connector.

>Has anyone on this newgroup actually built a Lindenblad. How well does it
>work for LEO satellites, such as the APT birds or digital hamsats?

I built a 137MHz Lindenblad by scaling the dimensions from a 146MHz design
in The Satellite Experimenters Handbook. I used CPVC pipe for the support
and folded heavy copper wire dipoles for the elements. The result was a bit
fragile. Putting the dipoles inside PVC pipe sounds like a better idea. At
137MHz you end up with a really unwieldy antenna. It looked really bizzare
on the roof, something like a perch for giant deformed birds.

It worked not all that great for weathersat reception. The problem seemed to
be periodic reflections from the ground. I would get regular noise bands
across the image. It also seemed to be fairly subject to terrestrial noise
pickup (ignition and/or powerline noise).

On the other hand, it seemed to cause a fairly constant signal level across
the pass. I would hear the satellite the instant it came above the horizon
(the Lindenblad has most of it's gain in that direction). The Lindenblad
might be a nice antenna for LEO voice or data communication if one could
live with the occasional fade. I've seen stuff written by others who use
them for the microsats.

I eventually ended up with a turnstile with a large area of chicken wire as
the reflector (something like 12 feet across (4 Metre)). This works very
well for weathersat work. I get noise free images from about 25 degrees
elevation and above. You really need the large reflector to prevent the
turnstile from seeing the ground reflections. I have no idea how the
turnstile-reflector that used to be in the Radio Amateur handbook worked
with the specified tiny reflector.

I'm wandering off the topic a bit, but if I was to do it again I would
investigate the quadrifillar helix as a weather sat antenna. You could
create a really nice gain pattern with little gain toward the ground. If
reflections were a problem one could try a small reflector below the helix
to put them where they wouldn't be a problem.

I haven't tried it, but the Zapper as described in The Weather Satellite Handbook looks good for weather sat work. It's just a 2 element circular polarized beam pointing straight up.

Bruce Walzer |Voice: (204) 783-4983
Winnipeg MB |Internet: bwalzer@mona.muug.mb.ca
Canada |AmateurRadio: VE4XOR

250. satellite help

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 10:41:14 UTC
From: gara@it12.bull.it
Message-ID: <gara.750076874@renzo>
Source record: 28660

Ciao Marco,
ho letto la tua mail molto velocemente.
Io lavoro su tutti i satelliti digitali e non (tranne serie RS).
Uso il programma istantrack per sapere l'acquisizione dei satelliti.
Visto che siamo anche vicini ci potremmo sentire in 2 metri,e scambiarci
le impressioni molto piu' velocemente che via iternet o packet.
Ciao ti saluto e fammi sapere qualcosa

73' de ivano

Ivano Garavaglia | I.Garavaglia IW2DMN@IW2GKO.#mi.ita.eu | BULL HN
I.Garavaglia@it12.bull.it | IW2DMN FO20-KO23-IO26(when ready) | Italy
039-2-67798234 | voice AO13 AO10 AO21 |
---

251. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 13:41:54 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Oct8.134154.1945@ke4zv.atl.ga.us>
Source record: 28461

In article <1993Oct8.005610.16062@muug.mb.ca> bwalzer@muug.mb.ca (Bruce Walzer) writes:
>In <CEJGF4.HFr@freenet.carleton.ca> ae517@Freenet.carleton.ca (Russ Renaud) writes:
>>Has anyone on this newgroup actually built a Lindenblad. How well does it
>>work for LEO satellites, such as the APT birds or digital hamsats?
>
>It worked not all that great for weathersat reception. The problem seemed to
>be periodic reflections from the ground. I would get regular noise bands
>across the image. It also seemed to be fairly subject to terrestrial noise
>pickup (ignition and/or powerline noise).

>I eventually ended up with a turnstile with a large area of chicken wire as
>the reflector (something like 12 feet across (4 Metre)). This works very
>well for weathersat work. I get noise free images from about 25 degrees
>elevation and above. You really need the large reflector to prevent the
>turnstile from seeing the ground reflections. I have no idea how the
>turnstile-reflector that used to be in the Radio Amateur handbook worked
>with the specified tiny reflector.

Well try the Lindenblad over the chicken wire. You might be pleased
with the result.

>I haven't tried it, but the Zapper as described in The Weather Satellite
>Handbook looks good for weather sat work. It's just a 2 element circular
>polarized beam pointing straight up.

This sucks. Most of the gain is straight up where you don't need it,
and the pattern toward the horizon is full of holes. The majority of
a pass is spent below 45 degrees above your local horizon. You need
to concentrate the pattern there. The Zapper does the reverse. The
turnstile over a groundplane is similar. If you don't have the ability
to use al-el tracking beams, about the best setup uses two 4 el beams
back to back tilted up about 30 degrees. All you have to do is line it
up for the pass and switch from one to the other when the bird goes
overhead. For passes that stay near the horizon, you just stay with
the beam pointing that way.

Gary
--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

252. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 15:47:24 UTC
From: P11163@email.mot.com
Message-ID: <1993Oct8.154724.12786@schbbs.mot.com>
Source record: 28462

In article <CEJGF4.HFr@freenet.carleton.ca>, ae517@Freenet.carleton.ca (Russ Renaud) says:
>
>
>I saw a brief construction article on the Lindenblad antenna for 137MHz
>using folded dipoles placed inside PVC tubing. The author does not
>described the method used to connect the 4 feedlines together, referencing
>past construction articles, which I assume provided these details.
>
>Should all four dipoles be fed in phase?
>
>Has anyone on this newgroup actually built a Lindenblad. How well does it
>work for LEO satellites, such as the APT birds or digital hamsats?
>
>Any info would be appreciated.
>
>73 de ve3uav/aa8lu
>
>--
Russ,
I have been using a homemade Lindenblad antenna for LEO WX satellite
reception for several years. They are about the best antenna for weather
satellite reception that I have ever found and I've tried them all. They provide
good gain at low elevation angles where the signals are usually weakest. In
a properly assembled antenna, there will some holes in the coverage at certain
elevation angles. Mine always has a major hole when the bird is at 80 degrees
elevation. Bt other than that, they are very good.

You do feed all the dipoles in phase. I I simply paralleled all of the four twin lead
phasing sections together on a female N connector and RTV'd the whole thing for
some semblence of a weather seal (rain is not the primary concern out here in AZ).
Polarization sense of the antenna is determined by the orientation of the dipoles.
When I built mine, I patterned it after the article that is in the Amatuer Radio
Satellite Handbook. I scaled it from the two meter design to 137 MHz.

Good luck. By the way, this is my first time on to USENET. I am using this message
to test the system. If it gets to you, please reply to let me know that it works.

73's....Ned

253. * SpaceNews 11-Oct-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 16:20:25 UTC
From: John Magliacane <kd2bd@ka2qhd.ocpt.ccur.com>
Message-ID: <$spc1011@ampr.org>
Source record: 28468
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1011
* SpaceNews 11-Oct-93 *

BID: $SPC1011

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SpaceNews
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MONDAY OCTOBER 11, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is
published every week and is made available for unlimited distribution.

* HAM RADIO TO FLY ON STS-58 *
============================
The third SAREX (Shuttle Amateur Radio Experiment) flight of 1993 is
scheduled for lift-off October 14 aboard the Space Shuttle Columbia
on a 13 day mission. Crew members include Pilot Richard A. Searfoss,
whose amateur license is pending, Mission Specialist William S. McArthur Jr.,
KC5ACR, and Payload Specialist Martin J. Fettman, KC5AXA.

Amateur Radio frequencies for the mission include: voice downlink (World-
wide) 145.550 MHz, voice uplinks 144.910, 144.930, 144.950, 144.970,
144.990 MHz, voice uplink (Europe only) 144.700, 144.750, 144.800 MHz,
and packet uplink: 144.490 MHz.

15 schools are scheduled to participate, in Arkansas, Texas, Ohio,
Missouri, Arizona, Tennessee, New Hampshire, Kentucky, Colorado, North
Carolina, Indiana, and France.

The 39 degree orbital inclination will bring the shuttle higher over the
temperate latitudes of the earth allowing more ground stations to hear the
Amateur Radio transmissions from the shuttle and possibly make radio contact
with the astronauts themselves.

SAREX configuration 'C' is planned for this mission. This configuration
includes FM voice and packet radio operations.

The following are pre-launch Keplerian elements for Shuttle mission STS-58:

STS-58
1 00058U 93287.67747791 .00119475 00000-0 26040-3 0 50
2 00058 39.0114 124.6663 0007676 272.4217 87.5676 15.96123499 22

Satellite: STS-58
Catalog number: 00058

Epoch time: 93287.67747791 = (14 OCT 93 16:15:34.09 UTC)
Element set: 005
Inclination: 39.0114 deg
RA of node: 124.6663 deg Space Shuttle Flight STS-58
Eccentricity: .0007676 Prelaunch Element set JSC-005
Arg of perigee: 272.4217 deg Launch: 14 OCT 93 14:53 UTC
Mean anomaly: 87.5676 deg
Mean motion: 15.96123499 rev/day Gil Carman, WA5NOM
Decay rate: 1.19475e-03 rev/day^2 NASA Johnson Space Center
Epoch rev: 2
Checksum: 329

* MIR OPERATING HINTS *
==========
This Week: "Logging Out of MIR"

More and more people are trying to use the MIR PBBS these days, and that is fine if we all follow some simple rules.

How many times have you seen a whole MIR pass full of <<DM>> messages (DM-Disconnect mode) with no data, and it appears that no one is logged in? Well, in reality someone IS logged in, but may have gone out of range of MIR and is unable to logout of the MIR PBBS. This results in the PBBS being tied up until the watchdog timer expires and forces a disconnect to the out-of-range station. After 7-10 minutes, MIR will try to force out the missing station with ten (10) <<D>> (D-Disconnect request) packets. After the last <<D>> packet, MIR will accept the next connect request heard.

Rule: If you are connected to the MIR PBBS, make sure you send the BYE command (B) to MIR 2-minutes before LOS. This will prevent ruining a whole pass for the stations down range of your QTH.

Remember, only one station can connect to MIR's PBBS at a time. All others must wait.

[Story by G. Miles Mann, WF1F]

* HELP WANTED *
==========
Trevor, G0KTN, is trying to obtain a G3RUH 1200 bps PSK modem printed circuit board which he would like to use for WEBERSAT reception. According to Trevor, G3RUH has discontinued the production of this PCB and the usual suppliers are now out of stock. There are several other English stations who are also in need of the modem circuit board.

Trevor can be reached via packet at: G0KTN @ GB7SDN.#49.GBR.EU.

* LUSAT NEWS *
==========
Frank, KB2MVN, of Alpaus, New York has set up a packet mailbox which can be accessed by using the LUSAT-OSCAR-19 satellite as a digipeater. Frank's mailbox beacons through the satellite when it is in range of his ground station:

KB2MVN>BEACON,LUSAT-1* <UI>:
KB2MVN MAILBOX OPEN PLEASE CONNECT Via Lusat-1

LO-19 command station LU8DYF reports that the satellite's on-board computer will be reloaded with directory broadcast software soon. Directory broadcast is a feature currently available on PACSAT-OSCAR-16.

* KITSAT-OSCAR-25 NEWS *
==========
SaTReC, KAIST Announces the Launch of KITSAT-OSCAR-25!

The Satellite Technology Research Center (SaTReC) at KAIST, Korea announces the successful launch and activation of a new OSCAR. KITSAT-2 was built in KAIST and is named as KITSAT-OSCAR-25 following the suggestions from the AMSAT group. KO-25 was launched by ariane 40 V59 launcher at 01:45 UTC on 26 September from Kourou Spatial Center of French Guyana. KO-25 was inserted into orbit 23 minutes after launch. KO-25 was activated 12:03 UTC on the same day from the Central Command Groundstation at SaTReC, KAIST.

KO-25 carries five payloads including a CCD Earth Imager, a Store-and-Forward mailer, a Digital Signal Processing Experiment for High Speed Modem tests and research, an Infra Red Sensor Experiment (IREX), a Low energy electron detector (LEED), and also a new computer system called KASCOM (KAIST Satellite Computer) developed for small satellites.

SaTReC sincerely express its gratitude for the help that AMSAT members have given to KAIST during their initial operation. Special thanks to Bill Tynan, Jim White, Harold Price, Jeff Ward, Eric A. Cottrell, Steve Greene, Peter Guezow, R. Campbell, Ron Parise, Tom Clark and those whom were active on the Internet during the development period.

SaTReC congratulates the EYESAT and ITAMSAT teams and the University of Surrey on the launch and activation of their satellites. For further information about SaTReC and the KITSAT-OSCAR-25 payload, please contact SaTReC via:

Tel : 82-42-869-8614
Fax : 82-42-861-0064
Internet : hskim@satrec.kaist.ac.kr

[Info via Hyung Shin Kim]

* FROM THE EDITOR *
==========
Over the past month, I have received a record number of requests from people with Internet addresses asking to be placed on the "SpaceNews mailing list". While such a list does exist, it is used primarily to increase article circulation speed across the world-wide packet radio network. Having geographically diverse entry points into the packet radio network, radio amateurs can receive these bulletins in an acceptable amount of time around the world.

Requests from single individuals who want SpaceNews mailed to them simply to avoid searching through the rec.radio.amateur.misc, sci.space.news, and rec.radio.info newsgroups on Usenet cannot not be accepted. It just takes more time than I have available to maintain a large and growing mailing list.

Please take advantage of the wide circulation SpaceNews currently enjoys through Usenet, amateur packet radio, digital amateur satellites, as well as the Internet (finger magliaco@pilot.njin.net).

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

Dana Rollins N2JUX KC4LDT OH7HJ

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

254. ORBS$281.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 20:05:21 UTC
From: Richard Campbell <G_RCAMPBELL@qualcomm.com>
Message-ID: <$orbs-281.o@ampr.org>
Source record: 28466
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-281.O
Orbital Elements 281.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX October 8, 1993
BID: $ORBS-281.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93279.33702867
Element set: 82
Inclination: 27.1481 deg
RA of node: 2.4799 deg
Eccentricity: 0.6019419
Arg of perigee: 119.8710 deg
Mean anomaly: 312.5993 deg
Mean motion: 2.05881755 rev/day
Decay rate: -8.1e-07 rev/day^2
Epoch rev: 7754
Checksum: 322

Satellite: UO-11
Catalog number: 14781
Epoch time: 93279.05004301
Element set: 486
Inclination: 97.8034 deg
RA of node: 300.5131 deg
Eccentricity: 0.0012576
Arg of perigee: 8.4843 deg
Mean anomaly: 351.6574 deg
Mean motion: 14.69061909 rev/day
Decay rate: 2.26e-06 rev/day^2
Epoch rev: 51299
Checksum: 298

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93278.03187301
Element set: 691
Inclination: 82.9286 deg
RA of node: 157.4421 deg
Eccentricity: 0.0012715
Arg of perigee: 19.6721 deg
```

Mean anomaly: 340.4929 deg
Mean motion: 13.72324084 rev/day
Decay rate: 8.5273e-04 rev/day^2
Epoch rev: 31491
Checksum: 309

Satellite: AO-13
Catalog number: 19216
Epoch time: 93281.01224299
Element set: 695
Inclination: 57.8884 deg
RA of node: 290.6961 deg
Eccentricity: 0.7215384
Arg of perigee: 325.7101 deg
Mean anomaly: 4.0040 deg
Mean motion: 2.09725266 rev/day
Decay rate: -1.11e-06 rev/day^2
Epoch rev: 4072
Checksum: 291

Satellite: FO-20
Catalog number: 20480
Epoch time: 93278.57339399
Element set: 501
Inclination: 99.0200 deg
RA of node: 113.7965 deg
Eccentricity: 0.0540564
Arg of perigee: 196.4232 deg
Mean anomaly: 161.8733 deg
Mean motion: 12.83221641 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17147
Checksum: 298

Satellite: AO-21
Catalog number: 21087
Epoch time: 93278.62193580
Element set: 905
Inclination: 82.9460 deg
RA of node: 331.1060 deg
Eccentricity: 0.0037009
Arg of perigee: 73.6883 deg
Mean anomaly: 286.8338 deg
Mean motion: 13.74525744 rev/day
Decay rate: 8.5270e-04 rev/day^2
Epoch rev: 13461
Checksum: 320

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93278.80710254

Element set: 471
Inclination: 82.9242 deg
RA of node: 200.0791 deg
Eccentricity: 0.0030408
Arg of perigee: 94.7391 deg
Mean anomaly: 265.7238 deg
Mean motion: 13.74027067 rev/day
Decay rate: 8.5206e-04 rev/day^2
Epoch rev: 13371
Checksum: 303

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93253.49977207
Element set: 23
Inclination: 1.2946 deg
RA of node: 120.3715 deg
Eccentricity: 0.2933550
Arg of perigee: 152.0186 deg
Mean anomaly: 99.4287 deg
Mean motion: 1.42203372 rev/day
Decay rate: -5.6e-07 rev/day^2
Epoch rev: 178
Checksum: 283

/EX
SB KEPS @ AMSAT $ORBS-281.D
Orbital Elements 281.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX October 8, 1993
BID: $ORBS-281.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93278.71261438
Element set: 777
Inclination: 98.6087 deg
RA of node: 1.7388 deg
Eccentricity: 0.0010392
Arg of perigee: 216.6364 deg
Mean anomaly: 143.4106 deg
Mean motion: 14.29794379 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 19322
Checksum: 319

Satellite: AO-16
Catalog number: 20439
Epoch time: 93278.70814662
Element set: 582

Inclination: 98.6157 deg
RA of node: 2.7150 deg
Eccentricity: 0.0010548
Arg of perigee: 217.0707 deg
Mean anomaly: 142.9747 deg
Mean motion: 14.29852298 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19323
Checksum: 316

Satellite: DO-17
Catalog number: 20440
Epoch time: 93278.75704706
Element set: 627
Inclination: 98.6160 deg
RA of node: 3.0053 deg
Eccentricity: 0.0010783
Arg of perigee: 216.6836 deg
Mean anomaly: 143.3609 deg
Mean motion: 14.29989186 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 19325
Checksum: 314

Satellite: WO-18
Catalog number: 20441
Epoch time: 93278.72813673
Element set: 628
Inclination: 98.6156 deg
RA of node: 2.9956 deg
Eccentricity: 0.0011265
Arg of perigee: 216.8040 deg
Mean anomaly: 143.2369 deg
Mean motion: 14.29967652 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19325
Checksum: 321

Satellite: LO-19
Catalog number: 20442
Epoch time: 93278.72302054
Element set: 625
Inclination: 98.6164 deg
RA of node: 3.1892 deg
Eccentricity: 0.0011532
Arg of perigee: 216.4188 deg
Mean anomaly: 143.6210 deg
Mean motion: 14.30059141 rev/day
Decay rate: 6.1e-07 rev/day^2
Epoch rev: 19326
Checksum: 270

Satellite: UO-22
Catalog number: 21575
Epoch time: 93278.68970014
Element set: 324
Inclination: 98.4627 deg
RA of node: 352.9751 deg
Eccentricity: 0.0007676
Arg of perigee: 337.8695 deg
Mean anomaly: 22.2159 deg
Mean motion: 14.36853977 rev/day
Decay rate: 6.8e-07 rev/day^2
Epoch rev: 11653
Checksum: 347

Satellite: KO-23
Catalog number: 22077
Epoch time: 93278.76031854
Element set: 160
Inclination: 66.0854 deg
RA of node: 92.6845 deg
Eccentricity: 0.0002474
Arg of perigee: 358.7953 deg
Mean anomaly: 1.3056 deg
Mean motion: 12.86280742 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5405
Checksum: 285

Satellite: AO-27
Catalog number: 22825
Epoch time: 93274.12386161
Element set: 5
Inclination: 98.6809 deg
RA of node: 347.1732 deg
Eccentricity: 0.0007375
Arg of perigee: 241.9084 deg
Mean anomaly: 118.1352 deg
Mean motion: 14.27580958 rev/day
Decay rate: -1.03e-06 rev/day^2
Epoch rev: 72
Checksum: 297

Satellite: IO-26
Catalog number: 22826
Epoch time: 93274.19358382
Element set: 4
Inclination: 98.6809 deg
RA of node: 347.2439 deg
Eccentricity: 0.0008040
Arg of perigee: 243.2830 deg
Mean anomaly: 116.7529 deg
Mean motion: 14.27685136 rev/day

Decay rate: 3.77e-06 rev/day^2
Epoch rev: 73
Checksum: 313

Satellite: KO-25
Catalog number: 22830
Epoch time: 93280.63866984
Element set: 10
Inclination: 98.5818 deg
RA of node: 353.5729 deg
Eccentricity: 0.0011095
Arg of perigee: 190.6946 deg
Mean anomaly: 169.4001 deg
Mean motion: 14.28007077 rev/day
Decay rate: 2.10e-06 rev/day^2
Epoch rev: 165
Checksum: 301

/EX
SB KEPS @ AMSAT $ORBS-281.W
Orbital Elements 281.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX October 8, 1993
BID: $ORBS-281.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93279.13769814
Element set: 511
Inclination: 99.0907 deg
RA of node: 321.1737 deg
Eccentricity: 0.0014269
Arg of perigee: 215.0530 deg
Mean anomaly: 144.9711 deg
Mean motion: 14.13549770 rev/day
Decay rate: 8.2e-07 rev/day^2
Epoch rev: 45444
Checksum: 310

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93279.02353885
Element set: 354
Inclination: 98.5169 deg
RA of node: 290.7467 deg
Eccentricity: 0.0013928
Arg of perigee: 355.1377 deg
Mean anomaly: 4.9686 deg
Mean motion: 14.24834131 rev/day
Decay rate: 5.8e-07 rev/day^2

Epoch rev: 36640
Checksum: 342

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93278.02288627
Element set: 929
Inclination: 82.5399 deg
RA of node: 111.5660 deg
Eccentricity: 0.0016269
Arg of perigee: 173.6665 deg
Mean anomaly: 186.4705 deg
Mean motion: 13.84694601 rev/day
Decay rate: 8.5229e-04 rev/day^2
Epoch rev: 28704
Checksum: 355

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93278.65591096
Element set: 67
Inclination: 82.5455 deg
RA of node: 143.8069 deg
Eccentricity: 0.0016538
Arg of perigee: 176.2985 deg
Mean anomaly: 183.8263 deg
Mean motion: 13.16961563 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 24975
Checksum: 348

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93277.93296591
Element set: 259
Inclination: 99.1439 deg
RA of node: 255.9680 deg
Eccentricity: 0.0012068
Arg of perigee: 126.4320 deg
Mean anomaly: 233.7955 deg
Mean motion: 14.12920163 rev/day
Decay rate: 9.5e-07 rev/day^2
Epoch rev: 25916
Checksum: 325

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93278.66462675
Element set: 831
Inclination: 82.5238 deg
RA of node: 346.8440 deg

Eccentricity: 0.0013488
Arg of perigee: 218.9823 deg
Mean anomaly: 141.0368 deg
Mean motion: 13.84345556 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 23247
Checksum: 338

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93278.50637636
Element set: 783
Inclination: 82.5499 deg
RA of node: 87.0477 deg
Eccentricity: 0.0015661
Arg of perigee: 199.0628 deg
Mean anomaly: 160.9909 deg
Mean motion: 13.16023772 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 18961
Checksum: 332

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93278.78753400
Element set: 626
Inclination: 82.5447 deg
RA of node: 50.5344 deg
Eccentricity: 0.0016314
Arg of perigee: 136.3134 deg
Mean anomaly: 223.9320 deg
Mean motion: 13.84179033 rev/day
Decay rate: 8.5200e-04 rev/day^2
Epoch rev: 16542
Checksum: 292

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93278.78871784
Element set: 678
Inclination: 98.8529 deg
RA of node: 301.8458 deg
Eccentricity: 0.0015640
Arg of perigee: 5.7512 deg
Mean anomaly: 354.3831 deg
Mean motion: 14.01302330 rev/day
Decay rate: 2.45e-06 rev/day^2
Epoch rev: 15807
Checksum: 320

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93278.68011622
Element set: 630
Inclination: 82.5291 deg
RA of node: 348.4787 deg
Eccentricity: 0.0014670
Arg of perigee: 44.0352 deg
Mean anomaly: 316.1974 deg
Mean motion: 13.83559776 rev/day
Decay rate: 8.5238e-04 rev/day^2
Epoch rev: 15256
Checksum: 328

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93278.71753460
Element set: 449
Inclination: 82.5460 deg
RA of node: 349.5022 deg
Eccentricity: 0.0014440
Arg of perigee: 100.3202 deg
Mean anomaly: 259.9549 deg
Mean motion: 13.16455754 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11787
Checksum: 293

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93278.54453335
Element set: 721
Inclination: 98.6497 deg
RA of node: 306.6003 deg
Eccentricity: 0.0012106
Arg of perigee: 256.5152 deg
Mean anomaly: 103.4685 deg
Mean motion: 14.22316133 rev/day
Decay rate: 1.37e-06 rev/day^2
Epoch rev: 12433
Checksum: 272

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93278.52367502
Element set: 507
Inclination: 82.5533 deg
RA of node: 296.5943 deg
Eccentricity: 0.0014494
Arg of perigee: 109.2260 deg
Mean anomaly: 251.0431 deg
Mean motion: 13.16824192 rev/day

Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10294
Checksum: 291

Satellite: NOAA-13
Catalog number: 22739
Epoch time: 93277.06382288
Element set: 25
Inclination: 098.9148 deg
RA of node: 217.8797 deg
Eccentricity: 0.0009985
Arg of perigee: 121.5673 deg
Mean anomaly: 238.7045 deg
Mean motion: 14.10854129 rev/day
Decay rate: 1.79e-06 rev/day^2
Epoch rev: 00783
Checksum: 344

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93277.11328007
Element set: 19
Inclination: 082.5464 deg
RA of node: 049.3555 deg
Eccentricity: 0.0021895
Arg of perigee: 222.6575 deg
Mean anomaly: 137.3459 deg
Mean motion: 13.82985449 rev/day
Decay rate: -9.0e-08 rev/day^2
Epoch rev: 00469
Checksum: 326

/EX
SB KEPS @ AMSAT $ORBS-281.M
Orbital Elements 281.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX October 8, 1993
BID: $ORBS-281.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93279.64313042
Element set: 403
Inclination: 51.6178 deg
RA of node: 19.4336 deg
Eccentricity: 0.0006237
Arg of perigee: 271.5821 deg
Mean anomaly: 88.4456 deg
Mean motion: 15.58056822 rev/day
Decay rate: 8.793e-05 rev/day^2

Epoch rev: 43650
Checksum: 310

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93278.80555295
Element set: 255
Inclination: 28.4696 deg
RA of node: 71.2857 deg
Eccentricity: 0.0004499
Arg of perigee: 122.5379 deg
Mean anomaly: 237.5642 deg
Mean motion: 14.92851686 rev/day
Decay rate: 7.04e-06 rev/day^2
Epoch rev: 18805
Checksum: 336

Satellite: GRO
Catalog number: 21225
Epoch time: 93278.35734058
Element set: 66
Inclination: 28.5187 deg
RA of node: 212.0882 deg
Eccentricity: 0.0111641
Arg of perigee: 9.9438 deg
Mean anomaly: 345.9905 deg
Mean motion: 15.77302008 rev/day
Decay rate: 5.0914e-04 rev/day^2
Epoch rev: 1749
Checksum: 304

Satellite: UARS
Catalog number: 21701
Epoch time: 93278.64533739
Element set: 301
Inclination: 56.9828 deg
RA of node: 98.8945 deg
Eccentricity: 0.0004765
Arg of perigee: 103.9118 deg
Mean anomaly: 256.2447 deg
Mean motion: 14.96188134 rev/day
Decay rate: 2.432e-05 rev/day^2
Epoch rev: 11282
Checksum: 318

Satellite: POSAT
Catalog number: 22829
Epoch time: 93277.20552868
Element set: 4
Inclination: 098.6744 deg
RA of node: 350.2287 deg

```
Eccentricity: 0.0010036
Arg of perigee: 225.2945 deg
Mean anomaly: 134.7970 deg
Mean motion: 14.27973759 rev/day
Decay rate: 1.15e-06 rev/day^2
Epoch rev: 00115
Checksum: 303

/EX
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```

255. ORBS$281.2liners

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 20:07:48 UTC
From: Richard Campbell <G_RCAMPBELL@qualcomm.com>
Message-ID: <$orbs-281.n@ampr.org>
Source record: 28467
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-281.N
2Line Orbital Elements 281.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX October 8, 1993
BID: $ORBS-281.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93279.33702867 -.00000081 00000-0 10000-3 0 824
2 14129 27.1481 2.4799 6019419 119.8710 312.5993 2.05881755 77546
UO-11
1 14781U 84021B 93279.05004301 .00000226 00000-0 42445-4 0 4863
2 14781 97.8034 300.5131 0012576 8.4843 351.6574 14.69061909512997
RS-10/11
1 18129U 87054A 93278.03187301 .00085273 00000-0 89555-4 0 6917
2 18129 82.9286 157.4421 0012715 19.6721 340.4929 13.72324084314917
AO-13
1 19216U 88051B 93281.01224299 -.00000111 00000-0 10000-4 0 6955
2 19216 57.8884 290.6961 7215384 325.7101 4.0040 2.09725266 40723
FO-20
1 20480U 90013C 93278.57339399 .00000015 00000-0 64973-4 0 5012
2 20480 99.0200 113.7965 0540564 196.4232 161.8733 12.83221641171478
AO-21
1 21087U 91006A 93278.62193580 .00085270 00000-0 82657-4 0 9058
2 21087 82.9460 331.1060 0037009 73.6883 286.8338 13.74525744134612
RS-12/13
1 21089U 91007A 93278.80710254 .00085206 00000-0 15747-4 0 4717
2 21089 82.9242 200.0791 0030408 94.7391 265.7238 13.74027067133711
ARSENE
1 22654U 93031B 93253.49977207 -.00000056 00000-0 10000-3 0 236
2 22654 1.2946 120.3715 2933550 152.0186 99.4287 1.42203372 1781
UO-14
1 20437U 90 5 B 93278.71261438 .00000051 00000-0 27704-4 0 7775
2 20437 98.6087 1.7388 0010392 216.6364 143.4106 14.29794379193227
AO-16
1 20439U 90 5 D 93278.70814662 .00000043 00000-0 24331-4 0 5827
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2 20439 98.6157 2.7150 0010548 217.0707 142.9747 14.29852298193235
DO-17
1 20440U 90005E 93278.75704706 .00000064 00000-0 32604-4 0 6276
2 20440 98.6160 3.0053 0010783 216.6836 143.3609 14.29989186193257
WO-18
1 20441U 90005F 93278.72813673 .00000043 00000-0 24642-4 0 6289
2 20441 98.6156 2.9956 0011265 216.8040 143.2369 14.29967652193254
LO-19
1 20442U 90005G 93278.72302054 .00000061 00000-0 31490-4 0 6252
2 20442 98.6164 3.1892 0011532 216.4188 143.6210 14.30059141193269
UO-22
1 21575U 91050B 93278.68970014 .00000068 00000-0 30010-4 0 3243
2 21575 98.4627 352.9751 0007676 337.8695 22.2159 14.36853977116537
KO-23
1 22077U 92052B 93278.76031854 .00000000 00000-0 10000-3 0 1603
2 22077 66.0854 92.6845 0002474 358.7953 1.3056 12.86280742 54059
AO-27
1 22825U 93061C 93274.12386161 -.00000103 00000-0 -33906-4 0 50
2 22825 98.6809 347.1732 0007375 241.9084 118.1352 14.27580958 727
IO-26
1 22826U 93061D 93274.19358382 .00000377 00000-0 16923-3 0 41
2 22826 98.6809 347.2439 0008040 243.2830 116.7529 14.27685136 732
KO-25
1 22830U 93061H 93280.63866984 .00000210 00000-0 92350-4 0 106
2 22830 98.5818 353.5729 0011095 190.6946 169.4001 14.28007077 1650
NOAA-9
1 15427U 84123A 93279.13769814 .00000082 00000-0 53856-4 0 5117
2 15427 99.0907 321.1737 0014269 215.0530 144.9711 14.13549770454446
NOAA-10
1 16969U 86073A 93279.02353885 .00000058 00000-0 32782-4 0 3543
2 16969 98.5169 290.7467 0013928 355.1377 4.9686 14.24834131366403
MET-2/17
1 18820U 88005A 93278.02288627 .00085229 00000-0 34359-4 0 9291
2 18820 82.5399 111.5660 0016269 173.6665 186.4705 13.84694601287049
MET-3/2
1 19336U 88 64 A 93278.65591096 .00000043 00000-0 99999-4 0 670
2 19336 82.5455 143.8069 0016538 176.2985 183.8263 13.16961563249754
NOAA-11
1 19531U 88089A 93277.93296591 .00000095 00000-0 61448-4 0 2594
2 19531 99.1439 255.9680 0012068 126.4320 233.7955 14.12920163259162
MET-2/18
1 19851U 89 18 A 93278.66462675 .00000064 00000-0 52396-4 0 8315
2 19851 82.5238 346.8440 0013488 218.9823 141.0368 13.84345556232475
MET-3/3
1 20305U 89086A 93278.50637636 .00000043 00000-0 10000-3 0 7838
2 20305 82.5499 87.0477 0015661 199.0628 160.9909 13.16023772189617
MET-2/19
1 20670U 90057A 93278.78753400 .00085200 00000-0 79036-5 0 6261
2 20670 82.5447 50.5344 0016314 136.3134 223.9320 13.84179033165422
FY-1/2
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1 20788U 90081A 93278.78871784 .00000245 00000-0 18522-3 0 6788
2 20788 98.8529 301.8458 0015640 5.7512 354.3831 14.01302330158078
MET-2/20
1 20826U 90086A 93278.68011622 .00085238 00000-0 43276-4 0 6300
2 20826 82.5291 348.4787 0014670 44.0352 316.1974 13.83559776152568
MET-3/4
1 21232U 91030A 93278.71753460 .00000043 00000-0 10000-3 0 4496
2 21232 82.5460 349.5022 0014440 100.3202 259.9549 13.16455754117871
NOAA-12
1 21263U 91032A 93278.54453335 .00000137 00000-0 70259-4 0 7211
2 21263 98.6497 306.6003 0012106 256.5152 103.4685 14.22316133124339
MET-3/5
1 21655U 91056A 93278.52367502 .00000043 00000-0 10000-3 0 5075
2 21655 82.5533 296.5943 0014494 109.2260 251.0431 13.16824192102946
NOAA-13
1 22739U 93050 A 93277.06382288 .00000179 00000-0 10006-3 0 252
2 22739 098.9148 217.8797 0009985 121.5673 238.7045 14.10854129007833
MET-2/21
1 22782U 93055 A 93277.11328007 -.00000009 00000-0 00000 0 0 195
2 22782 082.5464 049.3555 0021895 222.6575 137.3459 13.82985449004691
MIR
1 16609U 86017A 93279.64313042 .00008793 00000-0 12123-3 0 4036
2 16609 51.6178 19.4336 0006237 271.5821 88.4456 15.58056822436507
HUBBLE
1 20580U 90037B 93278.80555295 .00000704 00000-0 59148-4 0 2559
2 20580 28.4696 71.2857 0004499 122.5379 237.5642 14.92851686188058
GRO
1 21225U 91027B 93278.35734058 .00050914 -28759-5 18552-3 0 660
2 21225 28.5187 212.0882 0111641 9.9438 345.9905 15.77302008 17494
UARS
1 21701U 91063B 93278.64533739 .00002432 00000-0 23513-3 0 3014
2 21701 56.9828 98.8945 0004765 103.9118 256.2447 14.96188134112828
POSAT
1 22829U 93061 G 93277.20552868 .00000115 00000-0 46684-4 0 42
2 22829 098.6744 350.2287 0010036 225.2945 134.7970 14.27973759001151
/EX
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256. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-08 23:58:37 UTC
From: bwalzer@muug.mb.ca
Message-ID: <1993Oct8.235837.11621@muug.mb.ca>
Source record: 28463

In <1993Oct8.134154.1945@ke4zv.atl.ga.us> gary@ke4zv.atl.ga.us (Gary Coffman) writes:

[...]
> (Bruce Walzer) writes;
>>I haven't tried it, but the Zapper as described in The Weather Satellite
>>Handbook looks good for weather sat work. It's just a 2 element circular
>>polarized beam pointing straight up.

>This sucks. Most of the gain is straight up where you don't need it,
>and the pattern toward the horizon is full of holes. The majority of
>a pass is spent below 45 degrees above your local horizon. You need
>to concentrate the pattern there. The Zapper does the reverse. The
>turnstile over a groundplane is similar. If you don't have the ability

[...]

Well yes, but for weather sat work you are usually most interested in the
part of the continent near the place you live. The part of the pass that
occurs above 30 degrees is what you want. In areas of high terrestrial noise
(like the one I used to live in) something like the zapper or a turnstile is
the only thing that would produce noise free images. When given the choice
between a noisy image from horizon to horizon and a noise free one above 30
degrees sometimes you have to compromise.

Bruce Walzer |Voice: (204) 783-4983
Winnipeg MB |Internet: bwalzer@mona.muug.mb.ca
Canada |AmateurRadio: VE4XOR

257. Going to try QSO with STS-58, any suggestions???

Newsgroup: rec.radio.amateur.space
Date: 1993-10-09 02:41:12 UTC
From: bhackney@news.delphi.com
Message-ID: <2958c8$kr4@news.delphi.com>
Source record: 28464

Hello,

Im N3QBS and i am going to attempt a QSO this coming week with the
STS-58 SAREX mission. I would appreciate any helpful suggestions, like
how much power to use, what kind'uv antenna is best.

Thanx alot,
Ben Hackney N3QBS
bhackney@delphi.com

258. JAMSAT logo needed!!!

Newsgroup: rec.radio.amateur.space
Date: 1993-10-09 05:05:56 UTC
From: fmitch@netcom.com
Message-ID: <fmitchCEM65w.MEv@netcom.com>
Source record: 28465

hi, mitch here in mobile, alabama... i am building the tapr/jamsat trakbox and a friend is laying out a front panel for me with a graphics program (corel draw)... i want to put both the tapr and the jamsat logos on the front panel... we have the tapr logo digitized but i can't find the logo for jamsat to copy... is there anyone out there with a copy of the jamsat logo??? preferably a giff file? or, just plain hard copy would be great... i am ready to paint the front panel and need the logo desperately... i will be glad to make the layout graphic available on the net as soon as i get it finished... thanks...

mitch, wa4osr
--
fmitch@netcom.com
Felton Mitchell, WA4OSR in Mobile, Alabama USA
co-sysop for W4IAX bbs running fbb ... sysop for WA4OSR DXCluster in Mobile..

259. Two-Line Orbital Element Sets (TLE272)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-09 05:58:49 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.750146329@afit.af.mil>
Source record: 28469
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #272 -
Alouette 1
1 00424U 62 49 A 93278.71722257 .00000041 00000-0 44230-4 0 7421
2 00424 80.4680 176.0658 0024007 50.0206 310.3041 13.67782529547612
ATS 3
1 03029U 67111 A 93264.29116795 -.00000080 00000-0 99999-4 0 9802
2 03029 14.4725 10.2272 0011519 257.3538 91.9940 1.00272949 94732
Cosmos 398
1 04966U 71 16 A 93278.69166421 .00116564 29646-4 30760-3 0 5094
2 04966 51.4658 206.9249 1276350 1.7760 358.5715 13.29472610738134
Starlette
1 07646U 75010 A 93273.66197350 -.00000050 00000-0 82382-5 0 5380
2 07646 49.8261 97.4724 0206110 199.1127 160.1948 13.82184181941941
LAGEOS
1 08820U 76039 A 93270.34539619 .00000005 00000-0 99999-4 0 7020
2 08820 109.8590 45.5416 0044248 341.3368 18.5484 6.38664003150368
ETS-2
1 09852U 77014 A 93271.49999998 .00000063 00000-0 99999-4 0 7784
2 09852 11.6890 44.6370 0001985 73.6030 309.5390 1.00011263 00
GOES 2
1 10061U 77048 A 93278.55287001 .00000095 00000-0 99999-4 0 715
2 10061 10.7240 48.8016 0001209 78.9397 311.2066 1.00290341 4560
IUE
1 10637U 78012 A 93277.37999119 -.00000193 00000-0 00000+0 0 7981
2 10637 34.2113 99.0763 1308175 28.2162 331.9500 1.00284244 10156
GPS BI-01
1 10684U 78020 A 93260.60342881 -.00000007 00000-0 99999-4 0 570
2 10684 64.4767 53.6177 0064060 163.2410 196.9799 1.98069836 99533
GPS BI-02
1 10893U 78 47 A 93268.55706608 -.00000010 00000-0 99999-4 0 8127
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2 10893 63.6899 292.8742 0208174 13.3742 94.9091 2.01627012112737
GOES 3
1 10953U 78062 A 93278.54916044 .00000098 00000-0 99999-4 0 8033
2 10953 9.6466 51.5289 0006103 89.9754 255.0674 1.00283376 9168
SeaSat 1
1 10967U 78064 A 93274.04647239 .00000085 00000-0 49038-4 0 02
2 10967 108.0088 285.8946 0001503 271.1054 88.9919 14.37874187799112
GPS BI-03
1 11054U 78093 A 93275.37352609 -.00000009 00000-0 99999-4 0 9471
2 11054 63.3826 289.3582 0043880 176.0140 184.0535 1.93504877109527
Nimbus 7
1 11080U 78098 A 93278.71722858 .00000003 00000-0 18604-4 0 1360
2 11080 99.0817 166.3808 0009969 92.7498 267.4798 13.83720348754884
GPS BI-04
1 11141U 78112 A 93272.07823292 -.00000007 00000-0 99999-4 0 6289
2 11141 64.4790 54.0701 0048518 26.3325 333.9124 1.92895127107966
GPS BI-05
1 11690U 80 11 A 93278.61601734 -.00000006 00000-0 99999-4 0 5750
2 11690 64.8543 54.9708 0141644 198.5440 160.9363 2.00552595114437
GPS BI-06
1 11783U 80 32 A 93275.93979655 -.00000008 00000-0 99999-4 0 7774
2 11783 62.7951 286.8647 0204949 29.2667 331.8984 2.03457057 98728
GOES 5
1 12472U 81049 A 93276.51161712 .00000088 00000-0 99999-4 0 5541
2 12472 6.2949 60.9785 0004135 14.2491 351.6624 1.00221771 3198
Cosmos 1383
1 13301U 82 66 A 93278.65835764 .00000049 00000-0 50319-4 0 618
2 13301 82.9321 136.3857 0028921 76.4174 284.0196 13.68044178562622
LandSat 4
1 13367U 82 72 A 93274.17887013 .00000166 00000-0 41960-4 0 8681
2 13367 98.2164 331.8521 0007111 348.0545 12.0483 14.57112234596349
IRAS
1 13777U 83 4 A 93275.98353680 .00000106 00000-0 85016-4 0 3982
2 13777 98.9791 107.2017 0012760 310.2599 49.7449 13.99187930215266
Cosmos 1447
1 13916U 83 21 A 93278.74105215 .00000028 00000-0 23488-4 0 1427
2 13916 82.9482 199.8681 0038940 20.1342 340.1340 13.74295471528387
TDRS 1
1 13969U 83 26 B 93270.57361527 .00000120 00000-0 99999-4 0 559
2 13969 7.1798 53.8177 0001898 80.9577 267.1183 1.00276231 11423
GOES 6
1 14050U 83 41 A 93270.14790867 -.00000226 00000-0 99999-4 0 9540
2 14050 5.0630 64.1172 0002053 310.5485 329.2402 1.00262332 10151
OSCAR 10
1 14129U 83 58 B 93278.36595519 -.00000053 00000-0 99999-4 0 396
2 14129 27.1541 2.6311 6019084 119.6215 312.8723 2.05881098 49555
GPS BI-08
1 14189U 83 72 A 93149.63940343 -.00000008 00000-0 99999-4 0 4679
2 14189 63.9879 54.1319 0135726 236.1393 123.3793 2.00563668 72374
LandSat 5
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1 14780U 84 21 A 93278.75014934 .00000087 00000-0 24357-4 0 6792
2 14780 98.2007 338.0716 0004456 345.4559 14.6503 14.57117332510425
UoSat 2
1 14781U 84 21 B 93273.60110102 .00000181 00000-0 34679-4 0 4427
2 14781 97.8037 295.3091 0012843 24.5844 335.5972 14.69058828512194
GPS BI-09
1 15039U 84 59 A 93278.44825290 -.00000010 00000-0 99999-4 0 9369
2 15039 63.8103 49.0338 0053061 216.7223 142.9161 2.00562151 68220
Cosmos 1574
1 15055U 84 62 A 93274.99102244 .00000044 00000-0 40704-4 0 3926
2 15055 82.9515 255.4378 0026149 213.0831 146.8686 13.73592760465177
GPS BI-10
1 15271U 84 97 A 93272.89855496 -.00000008 00000-0 99999-4 0 5726
2 15271 62.5082 286.8348 0137851 344.8386 14.7955 2.00573525 65226
Cosmos 1602
1 15331U 84105 A 93277.60542478 .00000375 00000-0 43321-4 0 673
2 15331 82.5351 316.9904 0020014 332.6730 27.3431 14.84144759486603
NOAA 9
1 15427U 84123 A 93277.22655259 .00000080 00000-0 52528-4 0 4675
2 15427 99.0907 319.2320 0014269 220.6550 139.3558 14.13549349454175
GPS BI-11
1 16129U 85 93 A 93275.62359517 -.00000008 00000-0 99999-4 0 3057
2 16129 64.5665 51.1099 0131975 141.5440 219.3959 2.00564045 4988
Mir
1 16609U 93280.60521806 .00009876 00000-0 13519-3 0 4214
2 16609 51.6175 14.6054 0006201 277.0979 82.9307 15.58079945436655
SPOT 1
1 16613U 93280.47053040 .00000114 00000-0 62355-4 0 2828
2 16613 98.7197 353.2686 0000839 60.0949 300.0309 14.20036408 80686
Cosmos 1766
1 16881U 86 55 A 93278.70768683 .00000399 00000-0 47360-4 0 9188
2 16881 82.5215 14.0757 0019702 351.4993 8.5885 14.83179342387730
EGP
1 16908U 86 61 A 93271.73669060 -.00000025 00000-0 99999-4 0 6662
2 16908 50.0071 168.2002 0011374 7.6807 352.4200 12.44407967324214
NOAA 10
1 16969U 86 73 A 93276.63594081 .00000048 00000-0 28411-4 0 3118
2 16969 98.5171 288.4307 0013957 1.9769 358.1466 14.24833631366073
MOS-1
1 17527U 87 18 A 93275.26185800 .00000134 00000-0 12493-3 0 6326
2 17527 99.0664 343.9565 0000887 15.1104 345.0025 13.94892027336981
GOES 7
1 17561U 87 22 A 93271.26594219 -.00000022 00000-0 99999-4 0 4055
2 17561 0.9740 78.6916 0003772 349.7556 282.1101 1.00276518 7357
Kvant-1
1 17845U 87 30 A 93271.88987966 .00007972 00000-0 99999-4 0 4388
2 17845 51.6170 58.4129 0003521 127.2948 232.7904 15.59903886370247
DMSP B5D2-3
1 18123U 87 53 A 93278.51199615 .00000079 00000-0 50182-4 0 9271
2 18123 98.7932 108.9059 0013509 185.9175 174.1857 14.15309423324982
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RS-10/11
1 18129U 87 54 A 93274.02182318 .00000088 00000-0 89554-4 0 6544
2 18129 82.9289 160.4043 0012963 29.9551 330.2339 13.72323681314367
Meteor 2-16
1 18312U 87 68 A 93275.35788404 .00000057 00000-0 45748-4 0 332
2 18312 82.5560 56.3418 0013421 112.6463 247.6117 13.84007863309385
Meteor 2-17
1 18820U 88 5 A 93277.95062728 .00000045 00000-0 35163-4 0 8931
2 18820 82.5400 111.6235 0016273 173.8632 186.2730 13.84694604287030
DMSP B5D2-4
1 18822U 88 6 A 93277.73851385 .00000142 00000-0 71360-4 0 8291
2 18822 98.4722 137.8247 0007203 17.9665 342.1767 14.22883824294190
Glonass 34
1 19163U 88 43 A 93278.61207583 .00000015 00000-0 99999-4 0 6952
2 19163 64.9800 118.9774 0007857 166.0548 194.0380 2.13102350 41235
Glonass 36
1 19165U 88 43 C 93262.71311130 .00000015 00000-0 99999-4 0 8965
2 19165 64.9363 119.4920 0004036 345.3669 14.7188 2.13102220 41513
METEOSAT 3
1 19215U 88 51 A 93267.41672609 -.00000229 00000-0 99999-4 0 6509
2 19215 1.1462 73.8284 0002433 221.2245 143.3515 1.00285230 7242
AO-13
1 19216U 88 51 B 93269.09187191 -.00000232 00000-0 65920-3 0 6457
2 19216 57.8473 292.7149 7211645 324.9411 4.2235 2.09727479 8976
OKEAN 1
1 19274U 88 56 A 93277.93338833 .00000311 00000-0 37701-4 0 6183
2 19274 82.5121 114.4357 0021107 125.3111 235.0089 14.81972258283270
Meteor 3-2
1 19336U 88 64 A 93278.65591096 .00000043 00000-0 99999-4 0 670
2 19336 82.5455 143.8069 0016538 176.2985 183.8263 13.16961563249754
Glonass 39
1 19503U 88 85 C 93261.32960478 -.00000022 00000-0 99999-4 0 9508
2 19503 65.6942 358.5104 0002442 206.1629 153.8122 2.13099762 38974
NOAA 11
1 19531U 88 89 A 93277.22481993 .00000103 00000-0 65805-4 0 2229
2 19531 99.1438 255.2448 0012040 128.4049 231.8198 14.12920089259060
TDRS 2
1 19548U 88 91 B 93271.10389487 -.00000259 00000-0 99999-4 0 6886
2 19548 0.4290 79.7090 0001736 93.5122 169.1871 1.00267667 5581
Glonass 40
1 19749U 89 1 A 93269.81634976 .00000015 00000-0 99999-4 0 1729
2 19749 64.9241 118.8628 0005280 260.1859 99.8434 2.13101464 36680
Glonass 41
1 19750U 89 1 B 93260.48815853 .00000015 00000-0 99999-4 0 8930
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Cosmos 2263
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1 22805U 93 59 D 93267.57251436 .00000194 00000-0 22720-3 0 118
2 22805 70.9776 139.6819 0216274 83.8487 278.7227 13.68244297 1138
1993 059E
1 22806U 93 59 E 93275.57963683 .00000112 00000-0 14000-3 0 103
2 22806 71.0228 124.5731 0203256 49.8857 311.9867 13.71174358 2234
1993 059F
1 22807U 93 59 F 93274.06156171 -.00000200 00000-0 -17949-3 0 85
2 22807 71.0228 127.5876 0209074 75.1651 287.2527 13.69868162 2021
Cosmos 2264
1 22808U 93280.57678441 .00000462 00000-0 99999-5 0 885
2 22808 65.0240 332.2636 0011101 274.2825 85.7095 15.52056441 3198
SPOT 3
1 22823U 93 61 A 93281.11320408 .00000286 00000-0 15208-3 0 73
2 22823 98.7434 354.0616 0001357 94.9289 265.1961 14.20024943 1703
STELLA
1 22824U 93 61 B 93278.82311649 .00000022 00000-0 16945-4 0 62
2 22824 98.6845 351.8428 0005460 224.9301 135.1429 14.27092470 1380
KO-25
1 22825U 93 61 C 93272.44174106 -.00000264 00000-0 -99122-4 0 46
2 22825 98.6813 345.5037 0007327 248.1905 111.8494 14.27580455 482
POSAT-1
1 22826U 93 61 D 93272.86199979 .00000655 00000-0 28195-3 0 41
2 22826 98.6803 345.9208 0007952 245.7224 114.3082 14.27684427 538
HEATHSAT
1 22827U 93 61 E 93273.91290540 .00000025 00000-0 18021-4 0 22
2 22827 98.6789 346.9606 0008250 229.7481 130.2983 14.27784636 680
ITAMSAT
1 22828U 93 61 F 93272.37067678 -.00001528 00000-0 -61091-3 0 32
2 22828 98.6799 345.4264 0007175 242.4102 115.0288 14.27785657 473
EYESAT-1
1 22829U 93 61 G 93274.82416622 -.00288142 00000-0 -13089+0 0 75
2 22829 98.5833 347.8609 0012112 209.6782 150.2532 14.26556992 815
1993 061H
1 22830U 93 61 H 93277.97609757 .00000171 00000-0 76931-4 0 59
2 22830 98.5824 350.9573 0010976 198.8063 161.2715 14.28005612 1264
1993 062A
1 22836U 93 62 A 93278.86524397 -.00000122 00000-0 99999-4 0 68
2 22836 1.4839 276.5560 0012823 24.0315 109.7948 1.00166583 53
1993 062D
1 22839U 93 62 D 93275.48055833 -.00000166 00000-0 99999-4 0 35
2 22839 1.5146 277.0097 0016517 328.2473 28.3330 1.00155262 27
1993 063A
1 22859U 93 63 A 93278.93321046 -.00000020 00000-0 00000+0 0 10
2 22859 98.5446 352.1262 0001226 108.2267 251.9063 14.32266635 28
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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260. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-09 17:07:56 UTC
From: nlewis@terapin.com
Message-ID: <nlewis.0lqd@terapin.com>
Source record: 28470

gary@ke4zv.atl.ga.us (Gary Coffman) writes:

>In article <1993Oct8.005610.16062@muug.mb.ca> bwalzer@muug.mb.ca (Bruce
Walzer)
>writes:
>>In <CEJGF4.HFr@freenet.carleton.ca> ae517@Freenet.carleton.ca (Russ Renaud)
wri
>tes:
>>>Has anyone on this newgroup actually built a Lindenblad. How well does it
>>>work for LEO satellites, such as the APT birds or digital hamsats?
>>
>>It worked not all that great for weathersat reception. The problem seemed to
>>be periodic reflections from the ground. I would get regular noise bands
>>across the image. It also seemed to be fairly subject to terrestrial noise
>>pickup (ignition and/or powerline noise).
>
>>I eventually ended up with a turnstile with a large area of chicken wire as
>>the reflector (something like 12 feet across (4 Metre)). This works very
>>well for weathersat work. I get noise free images from about 25 degrees
>>elevation and above. You really need the large reflector to prevent the
>>turnstile from seeing the ground reflections. I have no idea how the
>>turnstile-reflector that used to be in the Radio Amateur handbook worked
>>with the specified tiny reflector.
>
>Well try the Lindenblad over the chicken wire. You might be pleased
>with the result.
>
>>I haven't tried it, but the Zapper as described in The Weather Satellite
>>Handbook looks good for weather sat work. It's just a 2 element circular
>>polarized beam pointing straight up.
>
>This sucks. Most of the gain is straight up where you don't need it,
>and the pattern toward the horizon is full of holes. The majority of
>a pass is spent below 45 degrees above your local horizon. You need
>to concentrate the pattern there. The Zapper does the reverse. The
>turnstile over a groundplane is similar. If you don't have the ability
>to use al-el tracking beams, about the best setup uses two 4 el beams
>back to back tilted up about 30 degrees. All you have to do is line it
>up for the pass and switch from one to the other when the bird goes
>overhead. For passes that stay near the horizon, you just stay with
>the beam pointing that way.
>
>Gary
>--

>Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
>Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
>534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
>Lawrenceville, GA 30244 | -Ray Stevens |
Yeah... but I've been using that "zapper" for about a year now with excellent results. There are regular lines of signal drop-out at about 5 degrees above the horizion, otherwise the antenna has performed very well indeed, especially considering how simple to build it is. Must admit though, my next project will be a J-pole...
-Ned

261. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-09 17:11:23 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Oct9.171123.7950@ke4zv.atl.ga.us>
Source record: 28472

In article <1993Oct8.235837.11621@muug.mb.ca> bwalzer@muug.mb.ca (Bruce Walzer) writes:
>
>Well yes, but for weather sat work you are usually most interested in the
>part of the continent near the place you live. The part of the pass that
>occurs above 30 degrees is what you want. In areas of high terrestrial noise
>(like the one I used to live in) something like the zapper or a turnstile is
>the only thing that would produce noise free images. When given the choice
>between a noisy image from horizon to horizon and a noise free one above 30
>degrees sometimes you have to compromise.

Point taken, however I'm most interested in what's to the NW of me,
I already know what the weather is doing over my head. :-)

Storm fronts here tend to move in from the NW, so I want to see some
advance warning pictures from that direction. I find a fixed elevation
4 el beam fine for that job. Actually the weather channel is even better,
but that's no fun. :-)

Gary
--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

262. Repeater in the Sky

Newsgroup: rec.radio.amateur.space
Date: 1993-10-10 02:11:48 UTC
From: ramays@amrad.win.net
Message-ID: <87@amrad.win.net>
Source record: 28471

Every Saturday afternoon the AMRAD ham club meets at a taco restaurant in Vienna, VA near Washington, DC. This weekend several club members conducted an experiment with the new AMRAD-OSCAR 27 payload. At the beginning of the 9 October 1642Z pass, N4USI at Tysons Corner, VA commanded the payload into the "bent pipe" FM repeater mode. This lets the bird repeat 145 MHz uplink signals down on 436.8. N4USI called CQ and was answered by Sandy, WB5MMB in Vienna, VA using a 25 watt 2 meter mobile transmitting into a 1/4 wavelength whip, and receiving on a 4 element handheld UHF Yagi. After a successful contact with Mark, N4TPY at Tysons, Sandy stood by for me to try a contact using nothing more than an Alinco DJ-580T and a Larsen dual band antenna, which is shorter than a 1/4 wave antenna on VHF. Although weaker, my signal did repeat through the satellite and I was able to hear the bird on UHF. And this was near the beginning of the pass. At times the signal was full quieting on the UHF downlink on the H-T.

Lyle, WA7GXD then called in from the AMSAT-NA Symposium in Arlington, TX, followed by N0ADI and KM4NZ (both named Chuck). Then we talked with Bill, W3XO. The last transmission through the bird on that pass was from Terry, WB4JFI, who was also using an H-T.

Often events like this are just discussed in technical terms. Today, however, I think a few of us remembered when we first saw someone talk to a spacecraft using a small handheld radio. It was back in the 1960's. His name was James Tiberius Kirk.

For more information on AMRAD, the Amateur Radio Research and Development Corporation, write to P.O. Drawer 6148, McLean, VA 22106 or call the AMRAD BBS at 703 734-1387.

73, Randy WA6VFC

263. Archive for Satellite Info?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-11 00:39:06 UTC
From: Jeffrey Puglielli <puglieli@phoenix.princeton.edu>
Message-ID: <1993Oct11.003906.16782@Princeton.EDU>
Source record: 28473

Can anyone point me in the direction of an archive site where I can find a complete list of amateur satellites that includes modes, frequencies, and other useful information? I!m particularly looking for info on those satellites with digital capability; whether they use FSK, AFSK, PSK; and the baud rate they operate at.

73s,
Jeff Puglielli, KD1FJ

264. satellite help

Newsgroup: rec.radio.amateur.space
Date: 1993-10-11 08:56:14 UTC
From: gara@it12.bull.it
Message-ID: <gara.750329774@renzo>
Source record: 28474

Ciao Marco,
ho letto la tua mail molto velocemente.
Io lavoro su tutti i satelliti digitali e non (tranne serie RS).
Uso il programma istantrack per sapere l'acquisizione dei satelliti.
Visto che siamo anche vicini ci potremmo sentire in 2 metri,e scambiarci
le impressioni molto piu' velocemente che via iternet o packet.
Ciao ti saluto e fammi sapere qualcosa

73' de ivano

Ivano Garavaglia | I.Garavaglia IW2DMN@IW2GKO.#mi.ita.eu | BULL HN
I.Garavaglia@it12.bull.it | IW2DMN FO20-KO23-IO26(when ready) | Italy
039-2-67798234 | voice AO13 AO10 AO21 |
---

265. Re: * SpaceNews 11-Oct-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-10-11 14:01:25 UTC
From: brandy@scalvin.win.net
Message-ID: <7@scalvin.win.net>
Source record: 28475
Cross-posted to: rec.radio.amateur.space,sci.space

```
=========
> SpaceNews
> =========
>
>
> MONDAY OCTOBER 11, 1993
>
>
>SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is
>published every week and is made available for unlimited distribution.
>
>
>* HAM RADIO TO FLY ON STS-58 *
>============================
>The third SAREX (Shuttle Amateur Radio Experiment) flight of 1993 is
>scheduled for lift-off October 14 aboard the Space Shuttle Columbia
>on a 13 day mission. Crew members include Pilot Richard A. Searfoss,
>whose amateur license is pending, Mission Specialist William S. McArthur Jr.,
>KC5ACR, and Payload Specialist Martin J. Fettman, KC5AXA.
>
>Amateur Radio frequencies for the mission include: voice downlink (World-
>wide) 145.550 MHz, voice uplinks 144.910, 144.930, 144.950, 144.970,
>144.990 MHz, voice uplink (Europe only) 144.700, 144.750, 144.800 MHz,
>and packet uplink: 144.490 MHz.
>
>15 schools are scheduled to participate, in Arkansas, Texas, Ohio,
>Missouri, Arizona, Tennessee, New Hampshire, Kentucky, Colorado, North
>Carolina, Indiana, and France.
>
>The 39 degree orbital inclination will bring the shuttle higher over the
>temperate latitudes of the earth allowing more ground stations to hear the
>Amateur Radio transmissions from the shuttle and possibly make radio contact
>with the astronauts themselves.
>
>SAREX configuration 'C' is planned for this mission. This configuration
>includes FM voice and packet radio operations.
>
>The following are pre-launch Keplerian elements for Shuttle mission STS-58:
>
>STS-58
>1 00058U 93287.67747791 .00119475 00000-0 26040-3 0 50
>2 00058 39.0114 124.6663 0007676 272.4217 87.5676 15.96123499 22
>
```

>Satellite: STS-58
>Catalog number: 00058
>Epoch time: 93287.67747791 = (14 OCT 93 16:15:34.09 UTC)
>Element set: 005
>Inclination: 39.0114 deg
>RA of node: 124.6663 deg Space Shuttle Flight STS-58
>Eccentricity: .0007676 Prelaunch Element set JSC-005
>Arg of perigee: 272.4217 deg Launch: 14 OCT 93 14:53 UTC
>Mean anomaly: 87.5676 deg
>Mean motion: 15.96123499 rev/day Gil Carman, WA5NOM
>Decay rate: 1.19475e-03 rev/day^2 NASA Johnson Space Center
>Epoch rev: 2
>Checksum: 329
>

>John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
>Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
>Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
>Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..
>

266. Where is the NASA type Sat Data?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-11 16:17:35 UTC
From: chbeck@anl.gov
Message-ID: <chbeck-111093113018@chbmac01.el.anl.gov>
Source record: 28476

(Sorry for the (old) question but) -- just where can I get
new (or current) NORAD/NASA 2- Line Satellite Data from via
internet?

Is there a conversion program from the AMSAT format?

(Could someone e-mail me a new set?)

Thanks--
de WO9K

--

"If I told you all that went down, it would burn off both your ears..."
-Robert Hunter/Jerry Garcia

These thoughts are only my own. CHBeck@anl.gov

267. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-11 23:14:50 UTC
From: "James R. Duffey" <ji3m@scubed.com>
Message-ID: <1993Oct11.231450.3158@scubed.com>
Source record: 28477

Subject: Lindenblad Antenna

>>In <CEJGF4.HFr@freenet.carleton.ca>
ae517@Freenet.carleton.ca (Russ Renaud) writes:
>>>Has anyone on this newgroup actually built a
Lindenblad. How well does it
>>>work for LEO satellites, such as the APT birds or
digital hamsats?
>>
(I don't have the original post so I am quoting from
someone elses quote-sorry. That can lead to misquotes and
problems at times)

>>It worked not all that great for weathersat reception.
The problem seemed to
>>be periodic reflections from the ground. I would get
regular noise bands
>>across the image. It also seemed to be fairly subject to
terrestrial noise
>>pickup (ignition and/or powerline noise).
>
This sounds like a problem with feedline imbalance. The
outer surface of the coax feedline is acting as an antenna
to pickup noise. Later on in the thread I find
P11163@email.mot.com (Ned Stearns) writes;

>You do feed all the dipoles in phase. I I simply
paralleled all of the four twin lead
>phasing sections together on a female N connector and
RTV'd the whole thing for
>some semblence of a weather seal (rain is not the primary
concern out here in AZ).
>Polarization sense of the antenna is determined by the
orientation of the dipoles.
>When I built mine, I patterned it after the article that
is in the Amatuer Radio
>Satellite Handbook. I scaled it from the two meter design
to 137 MHz.
>
If this is the way the antenna with the noise problem is
constructed, then a balanced antenna, the 4 paralleled
folded dipoles, is being fed with an unbalanced line,
coax. A 1:1 balanced to unbalanced transformer (1:1 balun)
should be used after the N connector. A W2DU type bead
balun can be used or you can check the handbook for a

simple 1:1 1/4 wavelength coax balun. This should reduce noise pickup by the feedline.

The LIndeblad is a neat way to generate circular polarization and was initially developed by Lindeblad at RCA to reduce ghosting on TV and FM from skyscrapers in New York CIty.

James R. Duffey KK6MC/5
S-Cubed Division of Maxwell Laboratories
2501 Yale Street SE Suite 300
Albuquerque, NM 87106
"Computers-Garbage in Gospel out"-Bill Powell

268. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 00:22:36 UTC
From: davem@rflab.ee.ubc.ca
Message-ID: <29ctcc$o5r@nntp.ucs.ubc.ca>
Source record: 28478
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In article <1993Oct11.231450.3158@scubed.com>,
James R. Duffey <ji3m@scubed.com> wrote:
>
>The Lindenblad is a neat way to generate circular
>polarization and was initially developed by Lindenblad at
>RCA to reduce ghosting on TV and FM from skyscrapers in
>New York City.

Without going into great detail, the notion that use of CP antennas reduces
multipath fading is largely wishful thinking on the part of Kraus and
others.

In an ideal setting where the ground is a *perfect* conductor, the
sense of the multipath wave is indeed reversed while its ellipticity
remains unchanged. In practice, incidence often occurs below the
Brewster angle and the sense of the multipath wave is *NOT* reversed.
Similarly, the ellipticity of the multipath wave is rarely preserved
on reflection.

There was certainly a great deal of interest in the use of CP antennas
to reduce multipath in TV during the late 1970's and early 1980's.
The NAB Conference Proceedings and IEEE Transactions on Broadcasting
contain quite a few papers on the subject. In practice, the results
were extremely disappointing and the matter was quickly abandoned.

--
Dave Michelson
davem@ee.ubc.ca

269. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 12:35:31 UTC
From: zlau@arrl.org
Message-ID: <2458@arrl.org>
Source record: 28497
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In rec.radio.amateur.antenna, gary@ke4zv.atl.ga.us (Gary Coffman) writes:
>
>We make extensive use of CP for our mobile microwave relays used
>in newsgathering. There, with CP antennas on both ends, we can
>achieve marked reductions in ghosting. We also often take deliberate
>advantage of multipath by aiming our antennas at a common high
>obstruction, such as a tall building. By switching the receive
>antenna to the reverse sense, we can often get clean pictures
>from the reflection when the direct path is a mess of ghosts.

What antenna gains are you using?

With even 20 dBi of antenna gain, multipath
is quite common between obstructed hilltop to hilltop
paths. Using 30+ dBi dishes on both ends will often
eliminate this effect on short paths. I remember one
case when W1XP had to work for 15 or 20 minutes to
complete a contact, with the signal fading in and out
(19 dBi horn), while I had a strong steady signal on my
30 dBi dish at the same time. Receivers were probably
pretty close--think he had a 7 dB NF out of an optimized
mixer and my setup way back when had a 6 dB system NF.

This was on 10 GHz, where 30 dBi of gain isn't too
difficult to get.

For point to point fixed links, increasing antenna gain
to eliminate multipath might make sense for some amateurs.

Zack Lau KH6CP/1

Internet: zlau@arrl.org "Working" on 24 GHz SSB/CW gear
Operating Interests: 10 GHz CW/SSB/FM
US Mail: c/o ARRL Lab 80/40/20 CW
225 Main Street Station capability: QRP, 1.8 MHz to 10 GHz
Newington CT 06111 modes: CW/SSB/FM/packet
amtor/baudot
Phone (if you really have to): 203-666-1541

270. Re: Where is the NASA type Sat Data?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 13:09:27 UTC
From: chbeck@anl.gov
Message-ID: <chbeck-121093082359@chbmac01.el.anl.gov>
Source record: 28479

In article <chbeck-111093113018@chbmac01.el.anl.gov>, chbeck@anl.gov (Chuck Beck) wrote:

> (Sorry for the (old) question but) -- just where can I get
> new (or current) NORAD/NASA 2- Line Satellite Data from via
> internet?
>
> Is there a conversion program from the AMSAT format?
>
> (Could someone e-mail me a new set?)
>
> Thanks--
> de WO9K
>

I should have waited- I see someone posted the new data, and where to get it. Thanks to those who did.

Now for the next question... All I have is a 2mtr sideband/cw rig, and a 10m setup. I successfully worked RS10 last night. It was fun. What other satellites can I work with this setup? Is there info on the others as to what freqs they support? FAQ? thanks.

"If I told you all that went down, it would burn off both your ears..."
-Robert Hunter/Jerry Garcia

These thoughts are only my own. CHBeck@anl.gov

271. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 13:36:47 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Oct12.133647.20217@ke4zv.atl.ga.us>
Source record: 28481
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In article <29ctcc$o5r@nntp.ucs.ubc.ca> davem@rflab.ee.ubc.ca (Dave Michelson) writes:
>In article <1993Oct11.231450.3158@scubed.com>,
>James R. Duffey <ji3m@scubed.com> wrote:
>>
>>The Lindenblad is a neat way to generate circular
>>polarization and was initially developed by Lindenblad at
>>RCA to reduce ghosting on TV and FM from skyscrapers in
>>New York City.
>
>Without going into great detail, the notion that use of CP antennas reduces
>multipath fading is largely wishful thinking on the part of Kraus and
>others.
>
>In an ideal setting where the ground is a *perfect* conductor, the
>sense of the multipath wave is indeed reversed while its ellipticity
>remains unchanged. In practice, incidence often occurs below the
>Brewster angle and the sense of the multipath wave is *NOT* reversed.
>Similarly, the ellipticity of the multipath wave is rarely preserved
>on reflection.
>
>There was certainly a great deal of interest in the use of CP antennas
>to reduce multipath in TV during the late 1970's and early 1980's.
>The NAB Conference Proceedings and IEEE Transactions on Broadcasting
>contain quite a few papers on the subject. In practice, the results
>were extremely disappointing and the matter was quickly abandoned.

You're about half right. We use a Harris CP antenna, and it does
not improve the ghosting situation. But the reasons why it doesn't
are that the viewers don't have CP antennas, so they get no rejection
effect, and because of multiple reflections. The circularity sense
reverses with each reflection, so a double reflection is the same
as no reflection at all because the sense is now back to that of
the original signal. The reason we use CP anyway is that it works
better with rabbit ears than a straight horizontally polarized
signal.

Ground reflections aren't the real issue. Most of the reflections
that cause ghosting are from buildings, water tanks, metal light
poles, and the like. They do give a clean reversal in most cases,
but that doesn't matter if the consumer isn't running an antenna
that can discriminate against signals of the opposite circularity.

We make extensive use of CP for our mobile microwave relays used
in newsgathering. There, with CP antennas on both ends, we can

achieve marked reductions in ghosting. We also often take deliberate advantage of multipath by aiming our antennas at a common high obstruction, such as a tall building. By switching the receive antenna to the reverse sense, we can often get clean pictures from the reflection when the direct path is a mess of ghosts.

Gary
--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

272. Re: Archive for Satellite Info?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 15:35:52 UTC
From: P11163@email.mot.com
Message-ID: <1993Oct12.153552.18377@schbbs.mot.com>
Source record: 28480

In article <1993Oct11.003906.16782@Princeton.EDU>, Jeffrey Puglielli
<puglieli@phoenix.princeton.edu> says:
>
>Can anyone point me in the direction of an archive site where I can find
>a complete list of amateur satellites that includes modes, frequencies,
>and other useful information? I!m particularly looking for info on those
>satellites with digital capability; whether they use FSK, AFSK, PSK; and
>the baud rate they operate at.
>
>73s,
>Jeff Puglielli, KD1FJ

Jeff,
I do a lot of satellite tracking and get thoroughly confused all the time. I generated this table to
attempt to keep me focussed while I'm tracking the bird. It. didn't survive cutting and pasting over to
my Windows-based usenet interface. So, hope you can use the data somehow. I have only listed the
modes that are currently known to work on each of the birds. The operating frequencies for the newer
birds (IO-26 through PO-28) are not fully rung out and their primary operating frequencies are not set
at this time. (The term ALIAS is the packet name for the bird for digital modes. To access a digital bird, you
would connect to it as PACSAT-11 in PB and PACSAT-12 in PG, for example.)

Good luck.
Ned Stearns AA7A

Sat (ALIAS) Uplink Dwnlink Mode
Name Freq Freq
===== ======= ================= ============== ============================
AO-10 435.05>.15 145.95>.85 Mode B Linear inv xponder

UO-11 145.826 Beacon

RS-10 145.86>.90 29.36>.40 Mode A Linear xponder
29.357/.404 Beacon/Robot

RS-12 21.21>.25 29.41>.45 Mode K Linear xponder
29.408/.454 Beacon/Robot

AO-13 435.45>.55 145.95>.85 Mode B Linear inv xponder
435.62 2400.73 Mode S Linear xponder
145.812 Beacon
2400.325/.664 Beacon

AO-16 (PACSAT) 145.90/.92/.94/.96 437.051 Mode J 1200 Baud PSK

DO-17 145.825 Beacon

---

273. Re: Lindenblad Antenna

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 21:56:46 UTC
From: davem@rflab.ee.ubc.ca
Message-ID: <29f96u$ru1@nntp.ucs.ubc.ca>
Source record: 28482
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In article <1993Oct12.133647.20217@ke4zv.atl.ga.us>,
Gary Coffman <gary@ke4zv.UUCP> wrote:
>>>
>>>The Lindenblad is a neat way to generate circular
>>>polarization and was initially developed by Lindenblad at
>>>RCA to reduce ghosting on TV and FM from skyscrapers in
>>>New York City.
>>
>>Without going into great detail, the notion that use of CP antennas reduces
>>multipath fading is largely wishful thinking on the part of Kraus and
>>others.
>
>You're about half right.

I wish that was the case. If CP antennas worked as well as some people
have suggested they do, the world would be a much happier place.

However, I have yet to see any experimental results which show that use
of CP antennas will *routinely* reduce multipath interference as simple
theory suggests. The hard evidence is lacking.

When CP transmitting antennas were introduced into the FM broadcasting
service, it was (as you suggest) mostly so that vertical (mobile) and
horizontal (fixed) receiving antennas would pick up the signals about
equally well.

When CP transmitting antennas were introduced into the TV broadcasting
service, the principal justification was the anticipated reduction in
multipath interference. None of the field trial reports that *I* ever
saw were very convincing. When the principal proponent of the idea
died (Sikola (sp?) of RCA (?)), the whole thing was abandoned.

About the same time, there was a lot of interest in using CP antennas
to eliminate multipath interference in microwave positioning systems
used in marine navigation and surveying. (So-called "range" holes
are a *real* problem in such systems.) Del Norte Technologies
conducted some preliminary field trials and concluded that, contrary
to expectations, use of CP antennas offered no real improvement.

>We use a Harris CP antenna, and it does
>not improve the ghosting situation. But the reasons why it doesn't
>are that the viewers don't have CP antennas, so they get no rejection
>effect,

Obviously.

>and because of multiple reflections. The circularity sense
>reverses with each reflection, so a double reflection is the same
>as no reflection at all because the sense is now back to that of
>the original signal. The reason we use CP anyway is that it works
>better with rabbit ears than a straight horizontally polarized
>signal.

Agreed. (see above.)

In certain situations, I'm sure that CP antennas will work as simple
theory suggests. In the vast majority of cases, especially the example
used by Kraus in "Antennas" 2nd ed., (p. 870), they will not.

>Ground reflections aren't the real issue. Most of the reflections
>that cause ghosting are from buildings, water tanks, metal light
>poles, and the like. They do give a clean reversal in most cases,
>but that doesn't matter if the consumer isn't running an antenna
>that can discriminate against signals of the opposite circularity.

>We make extensive use of CP for our mobile microwave relays used
>in newsgathering. There, with CP antennas on both ends, we can
>achieve marked reductions in ghosting. We also often take deliberate
>advantage of multipath by aiming our antennas at a common high
>obstruction, such as a tall building. By switching the receive
>antenna to the reverse sense, we can often get clean pictures
>from the reflection when the direct path is a mess of ghosts.

More than ever, I can see a real need for some CCIR type studies to
guide those who wish to employ CP in terrestrial systems...

Thanks for the reply, Gary. If you have anything more to add or
any reports/papers that you care to recommend, I'll be very happy
to hear about them.

Ever the skeptic...

--
Dave Michelson
davem@ee.ubc.ca

274. Weather Sat Info Needed

Newsgroup: rec.radio.amateur.space
Date: 1993-10-12 22:28:58 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7523@gold.gvg.tek.com>
Source record: 28483

I am thinking about receiving weather satellite pictures from the NOAA series birds on 137 MHz. I think I am all set on the receiving end, but need some ideas for the decoder of the 2400 Hz tone into pictures. Seems like someone must sell a simple decoder that would connect to a PC (Mac would be neat as well) that would decode and display on the computer's screen. Does anyone know of such a converter? A simple kit with software would be great.

If anyone has any ideas, please pass them on. Also any Telnet or FTP sites with info would also be useful.

Thanks,

Randy
WA2AGE

275. Circular polarization was(Re: Lindenblad Antenna)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-13 12:39:43 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Oct13.123943.27470@ke4zv.atl.ga.us>
Source record: 28484
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In article <29f96u$ru1@nntp.ucs.ubc.ca> davem@rflab.ee.ubc.ca (Dave Michelson) writes:
>In article <1993Oct12.133647.20217@ke4zv.atl.ga.us>,
>Gary Coffman <gary@ke4zv.UUCP> wrote:
>>We make extensive use of CP for our mobile microwave relays used
>>in newsgathering. There, with CP antennas on both ends, we can
>>achieve marked reductions in ghosting. We also often take deliberate
>>advantage of multipath by aiming our antennas at a common high
>>obstruction, such as a tall building. By switching the receive
>>antenna to the reverse sense, we can often get clean pictures
>>from the reflection when the direct path is a mess of ghosts.
>
>More than ever, I can see a real need for some CCIR type studies to
>guide those who wish to employ CP in terrestrial systems...
>
>Thanks for the reply, Gary. If you have anything more to add or
>any reports/papers that you care to recommend, I'll be very happy
>to hear about them.

We keep records of every microwave path we shoot. That averages
3 to 5 new ad hoc paths every day. We have the capability to
transmit and receive in any of horizontal, vertical, left hand
circular, or right hand circular. It's standard procedure to
run through the polarization combinations when setting up a
link. According to the records, we almost always wind up using
one or the other sense of circular polarization. The entries under
horizontal and vertical are almost always NG. We have a few cases
where we had to knife edge over a building, or around a building,
where horizontal or vertical polarization offered the best signal.
But such occurances are really atypical. When we have remotes on
adjacent channels, we generally try to have them use opposite
polarization sense to reduce interference. It works.

Most of our experience is in a metropolitan high rise environment
on 2 and 13 GHz. I don't claim that our experience would translate
to a rural setting. I will say that if you asked our operating
engineers to dispense with circular polarization they'd look at you
like you were crazy.

Gary
--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

276. STS Timeline

Newsgroup: rec.radio.amateur.space
Date: 1993-10-13 18:42:41 UTC
From: gtaylor@taex003n.tamu.edu
Message-ID: <gtaylor.243.750537761@taex003n.tamu.edu>
Source record: 28485

Is there a timeline for mission operations available somewhere? For example, on a previous mission I remember having a timeline showing a school contact x hours into the mission which I was then able to let the kids listen in on. I have the ARRL package but I don't find one in there.

73, Greg

Greg Taylor, KD4HZ // g-taylor4@tamu.edu // 409-845-4445 // Fax-847-8744

277. Re: Circular polarization was(Re: Lindenblad Antenna)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-14 00:30:44 UTC
From: davem@rflab.ee.ubc.ca
Message-ID: <29i6jk$38l@nntp.ucs.ubc.ca>
Source record: 28486
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

In article <1993Oct13.123943.27470@ke4zv.atl.ga.us>,
Gary Coffman <gary@ke4zv.UUCP> wrote:
>
>We keep records of every microwave path we shoot. That averages
>3 to 5 new ad hoc paths every day...
>
>Most of our experience is in a metropolitan high rise environment
>on 2 and 13 GHz. I don't claim that our experience would translate
>to a rural setting. I will say that if you asked our operating
>engineers to dispense with circular polarization they'd look at you
>like you were crazy.
>
>Gary
>--
>Gary Coffman KE4ZV
>Destructive Testing Systems

I'm a little bit confused... Who are "we"? Your signature refers to
"Destructive Testing Systems"... Do they routinely set up ad hoc
microwave links??

Anyway, thanks for passing on your "positive" results with CP. In view
of the negative results obtained by others, it seems to me that it would
be useful to conduct further research in this area.

The negative results were all obtained at UHF frequencies between 400 and
900 MHz. Their antennas were mostly omnidirectional. Your experience
seems to be at SHF with, I assume, directional antennas (small paraboloids??).

I assume these were all TV links... If I have time, I'll collect a few of
the papers from the early CP TV trials and send them to you for comment.

Interesting stuff...

Thanks again.

--
Dave Michelson
davem@ee.ubc.ca

278. Keps for the Moon

Newsgroup: rec.radio.amateur.space
Date: 1993-10-14 13:50:24 UTC
From: Ron.Parsons@f40.n382.z1.fidonet.org
Message-ID: <750600011.AA00149@afarm.uucp>
Source record: 28489

I need a set of 2-line Keps for the Moon.
Ron W5RKN

279. M2 Eggbeater Ant - Info?

Newsgroup: rec.radio.amateur.space
Date: 1993-10-14 20:28:00 UTC
From: S1.RSW@ISUMVS.IASTATE.EDU
Message-ID: <CEwM63.Lrp@news.iastate.edu>
Source record: 28487

Just a quick inquiry to netters who have experience using the M2 "Eggbeater" horizontally-polarized 2 meter antenna.

I'm considering a purchase of this antenna for use on 2m SSB (omnidirectional) and for the RS satellites, and would like to decide quickly (within a few days) whether this ANT would be a good addition to my "farm", before the #$%^@*&^% cold weather sets in.

I am aware of the product review on this antenna recently published in QST, but I'd like any additional comments from users of this unusual antenna as to performance, quality of manufacture, benchmark comparisons with other ants, or published figures for gain, directionality, change from horiz. to Circ. polarization, etc.

You may Internet me directly at s1.rsw@isumvs.iastate.edu, or post any comments here if you feel they would be of general interest.

Thanks in advance for your comments.

Rob Wallace, WA2SPO Conserve Biodiversity, Conserve Habitat
Ensure a healthy planet.

280. STS-58 Launch/Keps for October 15

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 08:20:47 UTC
From: ABFHB@STDVAX.GSFC.NASA.GOV
Message-ID: <$sts-58.001@ampr.org>
Source record: 28488
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.001
STS-58 Launch/Keps for October 15

Yesterday, the launch of the STS-58 Life Science mission was scrubbed at T-31 seconds due to a range safety computer problem. The flight has been rescheduled for a 14:53 liftoff today (October 15). Below is a new set of prelaunch Keplerian elements as generated by Gil Carman, WA5NOM, at the Johnson Space Center.

STS-58
1 00058U 93288.67747791 .00119475 00000-0 26040-3 0 62
2 00058 39.0114 125.6519 0007676 272.4217 87.5676 15.96123499 23

Satellite: STS-58
Catalog number: 00058
Epoch time: 93288.67747791 = (15 OCT 93 16:15:34.09 UTC)
Element set: 006
Inclination: 39.0114 deg
RA of node: 125.6519 deg Space Shuttle Flight STS-58
Eccentricity: .0007676 Prelaunch Element set JSC-006
Arg of perigee: 272.4217 deg Launch: 15 OCT 93 14:53 UTC
Mean anomaly: 87.5676 deg
Mean motion: 15.96123499 rev/day Gil Carman, WA5NOM
Decay rate: 1.19475e-03 rev/day^2 NASA Johnson Space Center
Epoch rev: 2
Checksum: 332

Submitted by Frank H. Bauer, KA3HDO, for the SAREX Working Group
/EX

281. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 11:03:54 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-750683028@unomaha.edu>
Source record: 28490
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

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Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.5 09/18/93 16:49:31
Changes: new mailing lists, .packet rmgroup, and .policy updates

(Note: The following is reprinted with the permission of the author.)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 18 September
1993 to add the mailing lists for the new rec.radio.amateur newsgroups, to
note the rmgroup of rec.radio.amateur.packet, and to officially retire some
(in)famous threads of discussion on rec.radio.amateur.policy.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
arrangement, but one was that the system was not supposed to be used for
commercial purposes. Since one of hams' favorite pastimes is swapping
gear, it was natural for hams to post messages about equipment for sale
to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use
restriction, and after some argument, a group was created specifically
```

for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize

this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, should be removed by September 21st, 1993. It is obsolete, and you should use .digital.misc instead (or the appropriate new mailing list, mentioned below). The group has .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. Recent changes to the Amateur Radio Rules (FCC Part 97) have finally laid to rest the Great Usenet Pizza Autopatch Debate as well as complaints about now-preempted local scanner laws hostile to amateurs, but plenty of discussion about what a bunch of rotten no-goodniks the local frequency coordinating body is, as well as the neverending no-code debate, may still be found here.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas,

commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

Except for rec.radio.swap and rec.radio.cb, all of these newsgroups are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
===========================

Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

282. ORBS$288O.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 14:16:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-288.o@ampr.org>
Source record: 28491
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-288.O
Orbital Elements 288.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX October 15, 1993
BID: $ORBS-288.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93279.33702867
Element set: 82
Inclination: 27.1481 deg
RA of node: 2.4799 deg
Eccentricity: 0.6019419
Arg of perigee: 119.8710 deg
Mean anomaly: 312.5993 deg
Mean motion: 2.05881755 rev/day
Decay rate: -8.1e-07 rev/day^2
Epoch rev: 7754
Checksum: 322

Satellite: UO-11
Catalog number: 14781
Epoch time: 93287.01910323
Element set: 602
Inclination: 97.8038 deg
RA of node: 308.1221 deg
Eccentricity: 0.0011698
Arg of perigee: 343.7711 deg
Mean anomaly: 16.3119 deg
Mean motion: 14.69066684 rev/day
Decay rate: 3.33e-06 rev/day^2
Epoch rev: 51416
Checksum: 289

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93286.63524979
Element set: 802
Inclination: 82.9272 deg
RA of node: 151.0843 deg
Eccentricity: 0.0011771
Arg of perigee: 355.8415 deg
```

Mean anomaly: 4.2641 deg
Mean motion: 13.72323405 rev/day
Decay rate: -1.37e-06 rev/day^2
Epoch rev: 31609
Checksum: 295

Satellite: AO-13
Catalog number: 19216
Epoch time: 93281.01224299
Element set: 695
Inclination: 57.8884 deg
RA of node: 290.6961 deg
Eccentricity: 0.7215384
Arg of perigee: 325.7101 deg
Mean anomaly: 4.0040 deg
Mean motion: 2.09725266 rev/day
Decay rate: -1.11e-06 rev/day^2
Epoch rev: 4072
Checksum: 291

Satellite: FO-20
Catalog number: 20480
Epoch time: 93286.05864589
Element set: 601
Inclination: 99.0206 deg
RA of node: 119.8565 deg
Eccentricity: 0.0540673
Arg of perigee: 179.4597 deg
Mean anomaly: 180.7200 deg
Mean motion: 12.83221389 rev/day
Decay rate: -1.4e-07 rev/day^2
Epoch rev: 17243
Checksum: 315

Satellite: AO-21
Catalog number: 21087
Epoch time: 93286.04684787
Element set: 354
Inclination: 82.9463 deg
RA of node: 325.6114 deg
Eccentricity: 0.0036668
Arg of perigee: 54.2687 deg
Mean anomaly: 306.1872 deg
Mean motion: 13.74525633 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 13563
Checksum: 325

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93285.72497418

Element set: 602
Inclination: 82.9243 deg
RA of node: 194.9512 deg
Eccentricity: 0.0030810
Arg of perigee: 77.1277 deg
Mean anomaly: 283.3318 deg
Mean motion: 13.74028313 rev/day
Decay rate: 1.42e-06 rev/day^2
Epoch rev: 13466
Checksum: 303

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93282.56758711
Element set: 201
Inclination: 1.3450 deg
RA of node: 116.0755 deg
Eccentricity: 0.2933466
Arg of perigee: 157.4440 deg
Mean anomaly: 219.9134 deg
Mean motion: 1.42201061 rev/day
Decay rate: -5.0e-07 rev/day^2
Epoch rev: 219
Checksum: 256

/EX

283. ORBS$288.D.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 14:20:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-288.d@ampr.org>
Source record: 28492
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-288.D
Orbital Elements 288.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX October 15, 1993
BID: $ORBS-288.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93287.74004034
Element set: 902
Inclination: 98.6074 deg
RA of node: 10.6604 deg
Eccentricity: 0.0010837
Arg of perigee: 188.2101 deg
Mean anomaly: 171.8903 deg
Mean motion: 14.29796548 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 19451
Checksum: 298

Satellite: AO-16
Catalog number: 20439
Epoch time: 93285.21602800
Element set: 702
Inclination: 98.6146 deg
RA of node: 9.1530 deg
Eccentricity: 0.0011065
Arg of perigee: 196.1718 deg
Mean anomaly: 163.9127 deg
Mean motion: 14.29854129 rev/day
Decay rate: 1.09e-06 rev/day^2
Epoch rev: 19416
Checksum: 293

Satellite: DO-17
Catalog number: 20440
Epoch time: 93287.78324469
Element set: 702
Inclination: 98.6149 deg
RA of node: 11.9369 deg
Eccentricity: 0.0011286
Arg of perigee: 187.9570 deg
```

Mean anomaly: 172.1434 deg
Mean motion: 14.29991244 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 19454
Checksum: 330

Satellite: WO-18
Catalog number: 20441
Epoch time: 93287.68449871
Element set: 703
Inclination: 98.6151 deg
RA of node: 11.8577 deg
Eccentricity: 0.0011859
Arg of perigee: 188.4687 deg
Mean anomaly: 171.6297 deg
Mean motion: 14.29969421 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 19453
Checksum: 355

Satellite: LO-19
Catalog number: 20442
Epoch time: 93285.71973157
Element set: 702
Inclination: 98.6154 deg
RA of node: 10.1138 deg
Eccentricity: 0.0012034
Arg of perigee: 194.7920 deg
Mean anomaly: 165.2908 deg
Mean motion: 14.30060813 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 19426
Checksum: 286

Satellite: UO-22
Catalog number: 21575
Epoch time: 93285.23553413
Element set: 402
Inclination: 98.4589 deg
RA of node: 359.4059 deg
Eccentricity: 0.0007231
Arg of perigee: 316.6360 deg
Mean anomaly: 43.4257 deg
Mean motion: 14.36856146 rev/day
Decay rate: 1.31e-06 rev/day^2
Epoch rev: 11747
Checksum: 303

Satellite: KO-23
Catalog number: 22077
Epoch time: 93278.76031854

Element set: 160
Inclination: 66.0854 deg
RA of node: 92.6845 deg
Eccentricity: 0.0002474
Arg of perigee: 358.7953 deg
Mean anomaly: 1.3056 deg
Mean motion: 12.86280742 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5405
Checksum: 285

Satellite: AO-27
Catalog number: 22825
Epoch time: 93285.75852196
Element set: 202
Inclination: 98.6768 deg
RA of node: 358.7223 deg
Eccentricity: 0.0007582
Arg of perigee: 207.9609 deg
Mean anomaly: 152.1156 deg
Mean motion: 14.27584304 rev/day
Decay rate: 1.08e-06 rev/day^2
Epoch rev: 237
Checksum: 321

Satellite: IO-26
Catalog number: 22826
Epoch time: 93285.89749859
Element set: 203
Inclination: 98.6800 deg
RA of node: 358.8662 deg
Eccentricity: 0.0008357
Arg of perigee: 209.4671 deg
Mean anomaly: 150.6040 deg
Mean motion: 14.27683559 rev/day
Decay rate: -7.38e-06 rev/day^2
Epoch rev: 240
Checksum: 341

Satellite: KO-25
Catalog number: 22830
Epoch time: 93286.24408072
Element set: 203
Inclination: 98.5818 deg
RA of node: 359.0811 deg
Eccentricity: 0.0011764
Arg of perigee: 176.3255 deg
Mean anomaly: 183.8015 deg
Mean motion: 14.28008897 rev/day
Decay rate: 3.88e-06 rev/day^2
Epoch rev: 245

```
Checksum: 309

/EX
```

284. ORBS$288.W.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 14:25:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-288.w@ampr.org>
Source record: 28493
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-288.W
Orbital Elements 288.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX October 15, 1993
BID: $ORBS-288.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93286.56991615
Element set: 603
Inclination: 99.0883 deg
RA of node: 328.7222 deg
Eccentricity: 0.0014761
Arg of perigee: 191.6283 deg
Mean anomaly: 168.4317 deg
Mean motion: 14.13551898 rev/day
Decay rate: -3.7e-07 rev/day^2
Epoch rev: 45549
Checksum: 343

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93282.32403798
Element set: 501
Inclination: 98.5167 deg
RA of node: 293.9484 deg
Eccentricity: 0.0013116
Arg of perigee: 347.1838 deg
Mean anomaly: 12.8994 deg
Mean motion: 14.24834419 rev/day
Decay rate: -7.9e-07 rev/day^2
Epoch rev: 36687
Checksum: 350

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93285.03200310
Element set: 201
Inclination: 82.5394 deg
RA of node: 105.9887 deg
Eccentricity: 0.0016962
Arg of perigee: 153.8192 deg
```

Mean anomaly: 206.3830 deg
Mean motion: 13.84694680 rev/day
Decay rate: 3.3e-07 rev/day^2
Epoch rev: 28801
Checksum: 297

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93288.07651144
Element set: 202
Inclination: 82.5421 deg
RA of node: 137.1408 deg
Eccentricity: 0.0017195
Arg of perigee: 152.6559 deg
Mean anomaly: 207.5504 deg
Mean motion: 13.16961632 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25099
Checksum: 295

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93286.57234186
Element set: 402
Inclination: 99.1474 deg
RA of node: 264.7961 deg
Eccentricity: 0.0012679
Arg of perigee: 103.4202 deg
Mean anomaly: 256.8674 deg
Mean motion: 14.12922617 rev/day
Decay rate: 1.86e-06 rev/day^2
Epoch rev: 26039
Checksum: 315

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93285.09728344
Element set: 202
Inclination: 82.5208 deg
RA of node: 341.7155 deg
Eccentricity: 0.0013817
Arg of perigee: 197.6615 deg
Mean anomaly: 162.3951 deg
Mean motion: 13.84346436 rev/day
Decay rate: 1.00e-06 rev/day^2
Epoch rev: 23336
Checksum: 306

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93287.40151059

Element set: 903
Inclination: 82.5504 deg
RA of node: 80.7645 deg
Eccentricity: 0.0016082
Arg of perigee: 174.5084 deg
Mean anomaly: 185.6564 deg
Mean motion: 13.16023037 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19078
Checksum: 286

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93284.85954447
Element set: 702
Inclination: 82.5464 deg
RA of node: 45.7127 deg
Eccentricity: 0.0017111
Arg of perigee: 120.8594 deg
Mean anomaly: 239.4252 deg
Mean motion: 13.84178556 rev/day
Decay rate: 9.6e-07 rev/day^2
Epoch rev: 16626
Checksum: 325

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93287.99948046
Element set: 805
Inclination: 98.8532 deg
RA of node: 310.7800 deg
Eccentricity: 0.0014848
Arg of perigee: 339.5002 deg
Mean anomaly: 20.5586 deg
Mean motion: 14.01308633 rev/day
Decay rate: 2.99e-06 rev/day^2
Epoch rev: 15936
Checksum: 329

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93286.20117621
Element set: 702
Inclination: 82.5269 deg
RA of node: 342.4946 deg
Eccentricity: 0.0014066
Arg of perigee: 25.5065 deg
Mean anomaly: 334.6787 deg
Mean motion: 13.83560871 rev/day
Decay rate: 9.6e-07 rev/day^2
Epoch rev: 15360

Checksum: 304

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93287.22970807
Element set: 603
Inclination: 82.5432 deg
RA of node: 343.4821 deg
Eccentricity: 0.0014836
Arg of perigee: 82.2352 deg
Mean anomaly: 278.0453 deg
Mean motion: 13.16455196 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11899
Checksum: 299

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93286.77520452
Element set: 805
Inclination: 98.6474 deg
RA of node: 314.6741 deg
Eccentricity: 0.0012266
Arg of perigee: 228.2203 deg
Mean anomaly: 131.8070 deg
Mean motion: 14.22316336 rev/day
Decay rate: -1.807e-05 rev/day^2
Epoch rev: 12549
Checksum: 288

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93285.20994771
Element set: 602
Inclination: 82.5547 deg
RA of node: 291.8713 deg
Eccentricity: 0.0014636
Arg of perigee: 96.3433 deg
Mean anomaly: 263.9392 deg
Mean motion: 13.16825416 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10382
Checksum: 314

Satellite: NOAA-13
Catalog number: 22739
Epoch time: 93277.06382288
Element set: 25
Inclination: 098.9148 deg
RA of node: 217.8797 deg
Eccentricity: 0.0009985

Arg of perigee: 121.5673 deg
Mean anomaly: 238.7045 deg
Mean motion: 14.10854129 rev/day
Decay rate: 1.79e-06 rev/day^2
Epoch rev: 00783
Checksum: 344

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93286.73557409
Element set: 202
Inclination: 82.5482 deg
RA of node: 41.7313 deg
Eccentricity: 0.0022204
Arg of perigee: 192.7322 deg
Mean anomaly: 167.3281 deg
Mean motion: 13.82987190 rev/day
Decay rate: 9.4e-07 rev/day^2
Epoch rev: 602
Checksum: 290

/EX

285. ORBS$288.M.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 14:27:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-288.m@ampr.org>
Source record: 28494
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-288.M
Orbital Elements 288.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX October 15, 1993
BID: $ORBS-288.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93287.91659936
Element set: 513
Inclination: 51.6198 deg
RA of node: 337.9204 deg
Eccentricity: 0.0006216
Arg of perigee: 305.1714 deg
Mean anomaly: 54.9308 deg
Mean motion: 15.58279881 rev/day
Decay rate: 1.2841e-04 rev/day^2
Epoch rev: 43779
Checksum: 338

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93285.89217617
Element set: 346
Inclination: 28.4714 deg
RA of node: 25.6000 deg
Eccentricity: 0.0004277
Arg of perigee: 200.8921 deg
Mean anomaly: 159.1488 deg
Mean motion: 14.92864914 rev/day
Decay rate: 1.014e-05 rev/day^2
Epoch rev: 18911
Checksum: 295

Satellite: GRO
Catalog number: 21225
Epoch time: 93287.69243962
Element set: 204
Inclination: 28.4596 deg
RA of node: 143.8399 deg
Eccentricity: 0.0031997
Arg of perigee: 73.7914 deg
```

Mean anomaly: 284.4661 deg
Mean motion: 15.69123449 rev/day
Decay rate: -3.187e-05 rev/day^2
Epoch rev: 1896
Checksum: 346

Satellite: UARS
Catalog number: 21701
Epoch time: 93278.64533739
Element set: 301
Inclination: 56.9828 deg
RA of node: 98.8945 deg
Eccentricity: 0.0004765
Arg of perigee: 103.9118 deg
Mean anomaly: 256.2447 deg
Mean motion: 14.96188134 rev/day
Decay rate: 2.432e-05 rev/day^2
Epoch rev: 11282
Checksum: 318

Satellite: POSAT
Catalog number: 22829
Epoch time: 93286.45464408
Element set: 203
Inclination: 98.6757 deg
RA of node: 359.4183 deg
Eccentricity: 0.0010287
Arg of perigee: 192.1840 deg
Mean anomaly: 167.9104 deg
Mean motion: 14.27974280 rev/day
Decay rate: -6.75e-06 rev/day^2
Epoch rev: 248
Checksum: 323

/EX

286. ORBS$288.2L

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 14:31:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-288.n@ampr.org>
Source record: 28495
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-288.N
2Line Orbital Elements 288.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX October 15, 1993
BID: $ORBS-288.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93279.33702867 -.00000081 00000-0 10000-3 0 824
2 14129 27.1481 2.4799 6019419 119.8710 312.5993 2.05881755 77546
UO-11
1 14781U 84 21 B 93287.01910323 .00000333 00000-0 60525-4 0 6026
2 14781 97.8038 308.1221 0011698 343.7711 16.3119 14.69066684514164
RS-10/11
1 18129U 87 54 A 93286.63524979 -.00000137 00000-0 -15715-3 0 8026
2 18129 82.9272 151.0843 0011771 355.8415 4.2641 13.72323405316099
AO-13
1 19216U 88051B 93281.01224299 -.00000111 00000-0 10000-4 0 6955
2 19216 57.8884 290.6961 7215384 325.7101 4.0040 2.09725266 40723
FO-20
1 20480U 90 13 C 93286.05864589 -.00000014 00000-0 -22763-5 0 6012
2 20480 99.0206 119.8565 0540673 179.4597 180.7200 12.83221389172438
AO-21
1 21087U 91 6 A 93286.04684787 .00000046 00000-0 41840-4 0 3542
2 21087 82.9463 325.6114 0036668 54.2687 306.1872 13.74525633135639
RS-12/13
1 21089U 91 7 A 93285.72497418 .00000142 00000-0 13846-3 0 6029
2 21089 82.9243 194.9512 0030810 77.1277 283.3318 13.74028313134664
ARSENE
1 22654U 93 31 B 93282.56758711 -.00000050 00000-0 99999-4 0 2010
2 22654 1.3450 116.0755 2933466 157.4440 219.9134 1.42201061 2195
UO-14
1 20437U 90 5 B 93287.74004034 .00000072 00000-0 35590-4 0 9020
2 20437 98.6074 10.6604 0010837 188.2101 171.8903 14.29796548194513
AO-16
1 20439U 90 5 D 93285.21602800 .00000109 00000-0 49992-4 0 7027
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2 20439 98.6146 9.1530 0011065 196.1718 163.9127 14.29854129194163
DO-17
1 20440U 90 5 E 93287.78324469 .00000081 00000-0 39393-4 0 7028
2 20440 98.6149 11.9369 0011286 187.9570 172.1434 14.29991244194543
WO-18
1 20441U 90 5 F 93287.68449871 .00000047 00000-0 26157-4 0 7030
2 20441 98.6151 11.8577 0011859 188.4687 171.6297 14.29969421194530
LO-19
1 20442U 90 5 G 93285.71973157 .00000081 00000-0 39132-4 0 7026
2 20442 98.6154 10.1138 0012034 194.7920 165.2908 14.30060813194262
UO-22
1 21575U 91 50 B 93285.23553413 .00000131 00000-0 51258-4 0 4027
2 21575 98.4589 359.4059 0007231 316.6360 43.4257 14.36856146117477
KO-23
1 22077U 92052B 93278.76031854 .00000000 00000-0 10000-3 0 1603
2 22077 66.0854 92.6845 0002474 358.7953 1.3056 12.86280742 54059
AO-27
1 22825U 93 61 C 93285.75852196 .00000108 00000-0 52220-4 0 2029
2 22825 98.6768 358.7223 0007582 207.9609 152.1156 14.27584304 2371
IO-26
1 22826U 93 61 D 93285.89749859 -.00000738 00000-0 -29118-3 0 2037
2 22826 98.6800 358.8662 0008357 209.4671 150.6040 14.27683559 2405
KO-25
1 22830U 93 61 H 93286.24408072 .00000388 00000-0 17241-3 0 2034
2 22830 98.5818 359.0811 0011764 176.3255 183.8015 14.28008897 2455
NOAA-9
1 15427U 84123 A 93286.56991615 -.00000037 00000-0 -93954-5 0 6036
2 15427 99.0883 328.7222 0014761 191.6283 168.4317 14.13551898455495
NOAA-10
1 16969U 86 73 A 93282.32403798 -.00000079 00000-0 -25557-4 0 5010
2 16969 98.5167 293.9484 0013116 347.1838 12.8994 14.24834419366877
MET-2/17
1 18820U 88 5 A 93285.03200310 .00000033 00000-0 23664-4 0 2013
2 18820 82.5394 105.9887 0016962 153.8192 206.3830 13.84694680288013
MET-3/2
1 19336U 88 64 A 93288.07651144 .00000043 00000-0 99999-4 0 2029
2 19336 82.5421 137.1408 0017195 152.6559 207.5504 13.16961632250992
NOAA-11
1 19531U 88 89 A 93286.57234186 .00000186 00000-0 12097-3 0 4022
2 19531 99.1474 264.7961 0012679 103.4202 256.8674 14.12922617260390
MET-2/18
1 19851U 89 18 A 93285.09728344 .00000100 00000-0 83752-4 0 2021
2 19851 82.5208 341.7155 0013817 197.6615 162.3951 13.84346436233368
MET-3/3
1 20305U 89 86 A 93287.40151059 .00000043 00000-0 99999-4 0 9036
2 20305 82.5504 80.7645 0016082 174.5084 185.6564 13.16023037190788
MET-2/19
1 20670U 90 57 A 93284.85954447 .00000096 00000-0 81070-4 0 7025
2 20670 82.5464 45.7127 0017111 120.8594 239.4252 13.84178556166268
FY-1/2
```

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1 20788U 90 81 A 93287.99948046 .00000299 00000-0 22124-3 0 8051
2 20788 98.8532 310.7800 0014848 339.5002 20.5586 14.01308633159367
MET-2/20
1 20826U 90 86 A 93286.20117621 .00000096 00000-0 81888-4 0 7023
2 20826 82.5269 342.4946 0014066 25.5065 334.6787 13.83560871153609
MET-3/4
1 21232U 91 30 A 93287.22970807 .00000043 00000-0 99999-4 0 6035
2 21232 82.5432 343.4821 0014836 82.2352 278.0453 13.16455196118993
NOAA-12
1 21263U 91 32 A 93286.77520452 -.00001807 00000-0 -80439-3 0 8050
2 21263 98.6474 314.6741 0012266 228.2203 131.8070 14.22316336125498
MET-3/5
1 21655U 91 56 A 93285.20994771 .00000043 00000-0 99999-4 0 6023
2 21655 82.5547 291.8713 0014636 96.3433 263.9392 13.16825416103826
NOAA-13
1 22739U 93050 A 93277.06382288 .00000179 00000-0 10006-3 0 252
2 22739 098.9148 217.8797 0009985 121.5673 238.7045 14.10854129007833
MET-2/21
1 22782U 93 55 A 93286.73557409 .00000094 00000-0 80089-4 0 2020
2 22782 82.5482 41.7313 0022204 192.7322 167.3281 13.82987190 6021
MIR
1 16609U 86 17 A 93287.91659936 .00012841 00000-0 17250-3 0 5137
2 16609 51.6198 337.9204 0006216 305.1714 54.9308 15.58279881437791
HUBBLE
1 20580U 90 37 B 93285.89217617 .00001014 00000-0 88377-4 0 3461
2 20580 28.4714 25.6000 0004277 200.8921 159.1488 14.92864914189112
GRO
1 21225U 91 27 B 93287.69243962 -.00003187 00000-0 -27197-4 0 2041
2 21225 28.4596 143.8399 0031997 73.7914 284.4661 15.69123449 18964
UARS
1 21701U 91063B 93278.64533739 .00002432 00000-0 23513-3 0 3014
2 21701 56.9828 98.8945 0004765 103.9118 256.2447 14.96188134112828
POSAT
1 22829U 93 61 G 93286.45464408 -.00000675 00000-0 -26396-3 0 2032
2 22829 98.6757 359.4183 0010287 192.1840 167.9104 14.27974280 2489
/EX
```

287. * SpaceNews 18-Oct-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 15:59:19 UTC
From: kd2bd@ka2qhd.de.com
Message-ID: <$spc1018@ampr.org>
Source record: 28496
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB NEWS @ AMSAT $SPC1018
* SpaceNews 18-Oct-93 *

BID: $SPC1018

=========
SpaceNews
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MONDAY OCTOBER 18, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* MIR OPERATING HINTS *
======================
This Week: Automated calling programs for packet radio communications

Several people have asked me what are the best programs to use that will automatically call Mir and the Shuttle while I am not at my station. My first response is: Are you that lazy? But really these program should be called Automatic QRMing Programs, because that is what they do best. You should NEVER use an Automatic QRM program to call Mir or the Space Shuttle. I have yet to see one of these programs that is smart enough to shut-up and not cause QRM. (In theory it is possible to develop an automatic calling program that would generate minimum QRM.)

On October 3, 1993, a station in New York left his Automatic QRMing program running all day while the operator was away. The result was that no one East of the Mississippi was able to reliably transfer any data to Mir for the whole day. This was because the Mir PBBS was too busy sending <<DM>> (DM-Disconnect mode) frames to the New York station. I counted over 120 DM messages to just this one station in one day.

What are the legalities of using such a program, since the Mir PBBS can only connect to one station at a time? Any station with excessive connect attempts while the PBBS is connected to someone else, is causing Intentional Interference and may be subject to FCC fines. The bottom line is be courteous to other operators and never use an Automated Packet calling program for Mir or the Space Shuttle.

Remember, only one station can connect to Mir's PBBS at a time. All others must wait.

[Story by G. Miles Mann, WF1F]

* FO-20 OPERATING SCHEDULE *
============================
Fuji-OSCAR-20's operating schedule for the rest of the month is as follows:

Analog (Mode JA):
20-Oct-93 08:12 UTC -to- 21-Oct-93 08:31 UTC
27-Oct-93 08:36 UTC -to- 28-Oct-93 08:55 UTC

Digital (Mode JD):
Unless otherwise noted above.

[Info via Gianni, IT9UJY]

* BIDs FOR PACSAT *
===================
Recently some bulletins without packet radio Bulletin-IDs ($BIDs) were uploaded to UO22/KO23 and were later found on terrestrial BBSs from several different ground stations with different $BIDs. These $BIDs were automatically created by the BBS since each file was uploaded without a specific bulletin ID. In order to remedy the situation, it has been suggested that a bulletin ID consisting of:

"<message number>_underscore_<satellite designation>"

be used as an 100% unequivocal Bulletin-ID (including the SAT ID), but ONLY if there is NO original $BID specified in the bulletin.

If a bulletin becomes message "b92f" (File b92f.msg) on UO22, then the $BID "$b92f_uo22" should be used for those transferring message "b92f" to their terrestrial packet radio BBS. A file from KO23 may get message number "$1234_ko23" and a file on AO16 may get message number "$9a2e_ao16" as its bulletin ID.

Using this convention will reduce unnecessary terrestrial packet radio bulletin duplication and network contention.

[Info via Peter, DB2OS @ DB0FAU.DEU.EU]

* LUSAT SOFTWARE RE-LOAD *
==========================
LUSAT-OSCAR-19 has been working for nearly two years without interruptions or a reload of the OBC software. On 11-Oct-93, satellite controller LU8DYF unloaded the old (but very reliable) BBS software (FTL0). The bird was sending telemetry every 30 seconds on the secondary transmitter frequency of 437.125 MHz. All the systems are working well. Reload of the latest FTL0 Pacsat file server software should be complete.

When LO-19 software uploads take place, it is important not to transmit on any of the satellite's uplink channels when the bird is over Argentina, as this slows down the reload process.

[Info via Norberto, LU8DYF]

* DOUBLE-HOP COMMUNICATIONS *
============================

Gordy, WB6OVH, has been making some cross-satellite contacts using AO-13 and RS-10. Gordy adjusted his uplink on AO-13 to produce a downlink of 145.885 MHz through the Mode B transponder. This frequency falls in the middle to RS-10's Mode A uplink passband. Walter, KA6VNU, contacted Gordy through RS-10 on a downlink frequency of 29.380 MHz.

Both stations had a lot of fun making the contact, and reminded both of the excitement of their first satellite contacts. The QSO which took place on 12-Oct-93 lasted about 8 minutes and just shows there is still fun to be had using the older amateur satellites.

[Info via WB6OVH]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

TA2D KA3BVJ VE3WWG F6KBR

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

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/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

288. NOAA Satellite Converter

Newsgroup: rec.radio.amateur.space
Date: 1993-10-15 20:38:48 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7544@gold.gvg.tek.com>
Source record: 28498
Cross-posted to: sci.electronics,rec.radio.shortwave,rec.radio.amateur.equipment,rec.radio.amateur.space

I am looking into receiving weather pictures from the NOAA satellites on 137 MHz. I need a converter to go from the receiver's audio to a pc.

Maybe someone can help me the following:

* Looking for a used converter that A&A sold for $50. They have stopped selling that unit.

* Would it be possible to build the A&A unit from a schematic? If so, does someone have on that they could pass along?

* Are there any other converter kits that would interface to a PC available?

Thanks,

Randy
WA2AGE

289. Two-Line Orbital Element Sets (TLE275)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-16 01:07:13 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.750733633@afit.af.mil>
Source record: 28500
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #275 -
Alouette 1
1 00424U 62 49 A 93285.66638617 .00000075 00000-0 84485-4 0 9020
2 00424 80.4668 169.2113 0023982 32.8462 327.4168 13.67783438548554
ATS 3
1 03029U 67111 A 93287.25662120 -.00000080 00000-0 99999-4 0 1027
2 03029 14.4995 9.9298 0012063 256.1379 103.7457 1.00273902 94969
Cosmos 398
1 04966U 71 16 A 93288.15545516 .00142960 30419-4 32970-3 0 7144
2 04966 51.4532 172.8574 1269505 27.4933 338.7644 13.32200442739394
Starlette
1 07646U 75010 A 93287.39894542 -.00000635 00000-0 -45155-3 0 7020
2 07646 49.8225 43.2611 0206268 244.2258 113.7222 13.82181594943841
LAGEOS
1 08820U 76039 A 93285.37814174 .00000005 00000-0 99999-4 0 9023
2 08820 109.8558 50.6903 0044037 338.2029 21.6605 6.38664609151313
ETS-2
1 09852U 77014 A 93283.43548882 .00000114 00000-0 99999-4 0 9018
2 09852 11.7161 44.6777 0000560 50.2727 309.6990 1.00000343 8153
GOES 2
1 10061U 77048 A 93284.45243271 .00000095 00000-0 99999-4 0 2039
2 10061 10.7234 48.7205 0000711 281.6496 78.3750 1.00287155 4618
IUE
1 10637U 78012 A 93285.37488582 -.00000193 00000-0 00000+0 0 9035
2 10637 34.2011 98.8942 1307747 28.5437 338.1448 1.00282040 10232
GPS BI-01
1 10684U 78020 A 93281.80814593 -.00000008 00000-0 99999-4 0 2011
2 10684 64.5000 52.9923 0064838 163.1404 197.0879 1.98069703 99950
GPS BI-02
1 10893U 78 47 A 93268.55706608 -.00000010 00000-0 99999-4 0 8127
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2 10893 63.6899 292.8742 0208174 13.3742 94.9091 2.01627012112737
GOES 3
1 10953U 78062 A 93287.56476935 .00000100 00000-0 99999-4 0 2022
2 10953 9.6648 51.4152 0005721 91.1772 268.9025 1.00286601 9255
SeaSat 1
1 10967U 78064 A 93286.70831120 -.00000059 00000-0 17136-5 0 2023
2 10967 108.0084 312.1088 0002179 277.4965 82.5925 14.37877910800936
GPS BI-03
1 11054U 78093 A 93283.12524434 -.00000009 00000-0 99999-4 0 1012
2 11054 63.3764 289.1380 0043555 175.9095 184.1617 1.93505226109675
Nimbus 7
1 11080U 78098 A 93287.75570368 .00000035 00000-0 46330-4 0 3051
2 11080 99.0801 175.1116 0009917 72.8247 287.3989 13.83721409756133
GPS BI-04
1 11141U 78112 A 93280.89134679 -.00000008 00000-0 99999-4 0 8016
2 11141 64.4953 53.8326 0048215 25.5106 334.7334 1.92895133108127
GPS BI-05
1 11690U 80 11 A 93278.61601734 -.00000006 00000-0 99999-4 0 5750
2 11690 64.8543 54.9708 0141644 198.5440 160.9363 2.00552595114437
GPS BI-06
1 11783U 80 32 A 93287.24440915 -.00000007 00000-0 99999-4 0 9011
2 11783 62.7804 286.4868 0205224 29.0424 332.1097 2.03456497 98953
GOES 5
1 12472U 81049 A 93283.47957263 .00000094 00000-0 99999-4 0 7019
2 12472 6.3032 60.9341 0004223 10.3688 349.6959 1.00224243 3266
Cosmos 1383
1 13301U 82 66 A 93285.60645767 .00000007 00000-0 18557-5 0 2023
2 13301 82.9288 131.2907 0028982 58.1451 302.2517 13.68044141563571
LandSat 4
1 13367U 82 72 A 93287.98141113 .00000052 00000-0 16548-4 0 3625
2 13367 98.2168 345.4669 0006134 302.4538 57.6066 14.57115725598350
IRAS
1 13777U 83 4 A 93285.56578342 -.00000096 00000-0 -54003-4 0 5020
2 13777 98.9747 116.5918 0012589 280.2635 79.7109 13.99184220216600
Cosmos 1447
1 13916U 83 21 A 93285.73035357 .00000060 00000-0 56596-4 0 3023
2 13916 82.9471 194.7015 0038324 1.2400 358.8844 13.74296307529342
TDRS 1
1 13969U 83 26 B 93286.56212634 .00000121 00000-0 99999-4 0 2068
2 13969 7.2087 53.6436 0000621 105.0093 255.0957 1.00278433 11573
GOES 6
1 14050U 83 41 A 93286.32766647 -.00000223 00000-0 99999-4 0 1028
2 14050 5.0923 63.7991 0002131 340.6309 19.4843 1.00257817 10302
OSCAR 10
1 14129U 83 58 B 93278.36595519 -.00000053 00000-0 99999-4 0 396
2 14129 27.1541 2.6311 6019084 119.6215 312.8723 2.05881098 49555
LandSat 5
1 14780U 84 21 A 93288.02048667 .00000146 00000-0 37503-4 0 9609
2 14780 98.2004 347.1970 0003768 316.6742 43.4160 14.57120654511773
UoSat 2
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1 14781U 84 21 B 93287.01910323 .00000333 00000-0 60525-4 0 6026
2 14781 97.8038 308.1221 0011698 343.7711 16.3119 14.69066684514164
GPS BI-09
1 15039U 84 59 A 93287.42301413 -.00000010 00000-0 99999-4 0 1039
2 15039 63.8235 48.7531 0053789 217.0617 142.5566 2.00561840 68415
Cosmos 1574
1 15055U 84 62 A 93285.99031144 .00000028 00000-0 23323-4 0 5021
2 15055 82.9550 247.3219 0027120 181.2300 178.8785 13.73593267466693
GPS BI-10
1 15271U 84 97 A 93287.35699320 -.00000008 00000-0 99999-4 0 7042
2 15271 62.4990 286.3589 0138674 345.0857 14.5246 2.00573744 65511
Cosmos 1602
1 15331U 84105 A 93285.08907303 .00000503 00000-0 58683-4 0 2016
2 15331 82.5354 309.9839 0018901 305.7062 54.2394 14.84151475487719
NOAA 9
1 15427U 84123 A 93286.56991615 -.00000037 00000-0 -93954-5 0 6036
2 15427 99.0883 328.7222 0014761 191.6283 168.4317 14.13551898455495
GPS BI-11
1 16129U 85 93 A 93285.59550154 -.00000008 00000-0 99999-4 0 5023
2 16129 64.5761 50.8004 0132181 141.5801 219.3708 2.00564047 5196
Mir
1 16609U 86 17 A 93287.91659936 .00012841 00000-0 17250-3 0 5137
2 16609 51.6198 337.9204 0006216 305.1714 54.9308 15.58279881437791
SPOT 1
1 16613U 93288.22117554 .00000113 00000-0 62355-4 0 2694
2 16613 98.7195 0.9054 0000827 71.2109 288.9157 14.20037813 81797
Cosmos 1766
1 16881U 86 55 A 93285.25169971 .00000598 00000-0 71576-4 0 1012
2 16881 82.5195 7.9477 0018655 330.0038 30.0107 14.83186618388705
EGP
1 16908U 86 61 A 93285.22943683 -.00000025 00000-0 99999-4 0 8029
2 16908 50.0095 126.7187 0011289 46.9084 313.2686 12.44408382325891
NOAA 10
1 16969U 86 73 A 93286.53744696 .00000123 00000-0 60766-4 0 5022
2 16969 98.5162 298.0351 0012930 334.9869 25.0954 14.24836425367470
MOS-1
1 17527U 87 18 A 93287.59927843 .00000134 00000-0 12493-3 0 9576
2 17527 99.0668 356.0792 0000119 338.5754 21.5369 13.94893994338694
GOES 7
1 17561U 87 22 A 93285.47418268 -.00000023 00000-0 99999-4 0 6022
2 17561 1.0047 78.4839 0003067 351.9169 9.3998 1.00277148 7491
Kvant-1
1 17845U 87 30 A 93287.85245643 .00031075 00000-0 40687-3 0 6057
2 17845 51.6194 338.2442 0006531 309.3029 50.7287 15.58294069437798
DMSP B5D2-3
1 18123U 87 53 A 93286.78337398 -.00005004 00000-0 -25626-2 0 1046
2 18123 98.7899 117.0614 0014447 158.7759 201.3948 14.15307712326154
RS-10/11
1 18129U 87 54 A 93286.63524979 -.00000137 00000-0 -15715-3 0 8026
2 18129 82.9272 151.0843 0011771 355.8415 4.2641 13.72323405316099
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Meteor 2-16
1 18312U 87 68 A 93285.40684195 .00000157 00000-0 13195-3 0 2020
2 18312 82.5570 48.3703 0013824 87.2406 273.0336 13.84009070310789
Meteor 2-17
1 18820U 88 5 A 93285.03200310 .00000033 00000-0 23664-4 0 2013
2 18820 82.5394 105.9887 0016962 153.8192 206.3830 13.84694680288013
DMSP B5D2-4
1 18822U 88 6 A 93286.80975340 .00000146 00000-0 73056-4 0 2042
2 18822 98.4694 146.5521 0006573 353.6769 6.4321 14.22886741295484
Glonass 34
1 19163U 88 43 A 93278.61207583 .00000015 00000-0 99999-4 0 6952
2 19163 64.9800 118.9774 0007857 166.0548 194.0380 2.13102350 41235
Glonass 36
1 19165U 88 43 C 93262.71311130 .00000015 00000-0 99999-4 0 8965
2 19165 64.9363 119.4920 0004036 345.3669 14.7188 2.13102220 41513
METEOSAT 3
1 19215U 88 51 A 93287.34419412 -.00000232 00000-0 99999-4 0 8027
2 19215 1.1678 71.3281 0003302 212.7303 148.6861 1.00279818 7446
AO-13
1 19216U 88 51 B 93279.10498030 -.00000254 00000-0 99999-5 0 8010
2 19216 57.9061 291.0473 7217744 325.4779 4.0165 2.09727946 9184
OKEAN 1
1 19274U 88 56 A 93285.02290912 .00000413 00000-0 50475-4 0 8017
2 19274 82.5093 107.8030 0021558 104.8014 255.5596 14.81976645284327
Meteor 3-2
1 19336U 88 64 A 93288.07651144 .00000043 00000-0 99999-4 0 2029
2 19336 82.5421 137.1408 0017195 152.6559 207.5504 13.16961632250992
Glonass 39
1 19503U 88 85 C 93261.32960478 -.00000022 00000-0 99999-4 0 9508
2 19503 65.6942 358.5104 0002442 206.1629 153.8122 2.13099762 38974
NOAA 11
1 19531U 88 89 A 93286.57234186 .00000186 00000-0 12097-3 0 4022
2 19531 99.1474 264.7961 0012679 103.4202 256.8674 14.12922617260390
TDRS 2
1 19548U 88 91 B 93285.11534644 -.00000259 00000-0 99999-4 0 8027
2 19548 0.4605 84.0010 0001593 126.2214 149.8559 1.00263779 5712
Glonass 40
1 19749U 89 1 A 93269.81634976 .00000015 00000-0 99999-4 0 1729
2 19749 64.9241 118.8628 0005280 260.1859 99.8434 2.13101464 36680
Glonass 41
1 19750U 89 1 B 93260.48815853 .00000015 00000-0 99999-4 0 8930
2 19750 64.9310 119.2281 0006508 247.0308 112.9997 2.13101953 36488
GPS BII-01
1 19802U 89 13 A 93284.93854756 .00000014 00000-0 99999-4 0 8010
2 19802 55.0615 149.5643 0035563 173.3290 186.8144 2.00564909 34063
Akebono
1 19822U 89 16 A 93287.59122426 .00017317 00000-0 10014-2 0 1063
2 19822 75.0894 320.2704 3850094 110.1825 294.7823 7.71898133 90250
Meteor 2-18
1 19851U 89 18 A 93285.09728344 .00000100 00000-0 83752-4 0 2021
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2 19851 82.5208 341.7155 0013817 197.6615 162.3951 13.84346436233368
MOP-1
1 19876U 89 20 B 93275.94556880 .00000011 00000-0 00000+0 0 7013
2 19876 0.3045 24.6903 0001577 155.4581 170.8433 1.00274423 4540
TDRS 3
1 19883U 89 21 B 93284.05884763 -.00000240 00000-0 00000+0 0 8025
2 19883 0.0140 282.1311 0004155 46.8584 31.0149 1.00274106 86984
GPS BII-02
1 20061U 89 44 A 93285.27927539 -.00000029 00000-0 99999-4 0 8018
2 20061 54.7631 326.5495 0124975 204.2897 155.1809 2.00566420 31829
Nadezhda 1
1 20103U 89 50 A 93288.00829032 .00000116 00000-0 11105-3 0 9047
2 20103 82.9572 108.5757 0036271 252.5814 107.1374 13.73827146214642
GPS BII-03
1 20185U 89 64 A 93284.61480280 .00000014 00000-0 99999-4 0 8014
2 20185 54.8971 150.2192 0006870 229.8871 130.1476 2.00555849 30373
GMS 4
1 20217U 89 70 A 93286.54988202 -.00000261 00000-0 99999-4 0 9025
2 20217 0.0420 253.0685 0000607 29.0921 77.8751 1.00263327 15628
GPS BII-04
1 20302U 89 85 A 93285.64649248 -.00000007 00000-0 99999-4 0 8016
2 20302 53.7379 267.0578 0007190 309.3607 50.5720 2.00560440 29194
Meteor 3-3
1 20305U 89 86 A 93287.40151059 .00000043 00000-0 99999-4 0 9036
2 20305 82.5504 80.7645 0016082 174.5084 185.6564 13.16023037190788
COBE
1 20322U 89 89 A 93287.02846705 .00000287 00000-0 20642-3 0 9022
2 20322 98.9904 301.2599 0008474 230.7075 129.3342 14.03423236199861
Kvant-2
1 20335U 89 93 A 93287.91655564 .00030751 00000-0 40267-3 0 7055
2 20335 51.6195 337.9232 0006341 308.5633 51.2972 15.58297551437809
GPS BII-05
1 20361U 89 97 A 93285.65357455 .00000001 00000-0 99999-4 0 7013
2 20361 55.4022 92.1157 0072366 101.5722 259.2770 2.00566999 18680
SPOT 2
1 20436U 93288.18964567 .00000120 00000-0 65160-4 0 3518
2 20436 98.6941 1.2434 0000650 116.9143 243.2041 14.20046968193328
UO-14
1 20437U 90 5 B 93287.74004034 .00000072 00000-0 35590-4 0 9020
2 20437 98.6074 10.6604 0010837 188.2101 171.8903 14.29796548194513
UO-15
1 20438U 90 5 C 93286.72283365 .00000075 00000-0 37377-4 0 7020
2 20438 98.6076 8.8892 0009843 193.3930 166.6991 14.29146236194305
PACSAT
1 20439U 90 5 D 93285.21602800 .00000109 00000-0 49992-4 0 7027
2 20439 98.6146 9.1530 0011065 196.1718 163.9127 14.29854129194163
DO-17
1 20440U 90 5 E 93287.78324469 .00000081 00000-0 39393-4 0 7028
2 20440 98.6149 11.9369 0011286 187.9570 172.1434 14.29991244194543
WO-18
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1 20441U 90 5 F 93287.68449871 .00000047 00000-0 26157-4 0 7030
2 20441 98.6151 11.8577 0011859 188.4687 171.6297 14.29969421194530
LO-19
1 20442U 90 5 G 93285.71973157 .00000081 00000-0 39132-4 0 7026
2 20442 98.6154 10.1138 0012034 194.7920 165.2908 14.30060813194262
GPS BII-06
1 20452U 90 8 A 93285.06226148 .00000011 00000-0 99999-4 0 8020
2 20452 54.0748 206.6169 0051236 70.0676 290.4968 2.00562920 27166
MOS-1B
1 20478U 90 13 A 93287.21441182 .00000117 00000-0 99999-4 0 5046
2 20478 99.0626 359.8212 0000648 87.1509 272.9748 13.94897085108353
DEBUT
1 20479U 90 13 B 93287.57892709 .00000006 00000-0 43249-4 0 7014
2 20479 99.0216 121.1623 0540485 175.8559 184.7291 12.83308429172634
FO-20
1 20480U 90 13 C 93286.05864589 -.00000014 00000-0 -22763-5 0 6012
2 20480 99.0206 119.8565 0540673 179.4597 180.7200 12.83221389172438
MOS-1B R/B
1 20491U 90 13 D 93274.14638458 -.00000382 00000-0 -69234-3 0 7397
2 20491 99.0507 147.8488 0470434 94.9214 270.5754 13.02970395172929
LACE
1 20496U 90 15 A 93288.08873629 .00003790 00000-0 13096-3 0 3039
2 20496 43.1033 0.6691 0014070 225.2828 134.6880 15.31416435203918
Nadezhda 2
1 20508U 90 17 A 93288.03001077 .00000058 00000-0 56258-4 0 9038
2 20508 82.9527 243.2181 0043546 201.2924 158.6422 13.73461094181896
OKEAN 2
1 20510U 90 18 A 93284.83218462 .00000388 00000-0 51894-4 0 2023
2 20510 82.5217 55.4642 0017367 284.0349 75.8934 14.78154348194976
INTELSAT-6
1 20523U 90 21 A 93287.03375317 -.00000217 00000-0 99999-4 0 3020
2 20523 0.0232 126.7968 0000701 43.0335 190.3962 1.00268730 6144
GPS BII-07
1 20533U 90 25 A 93285.46776252 -.00000029 00000-0 99999-4 0 8018
2 20533 55.1039 326.9974 0040263 86.4643 274.0599 2.00561641 25956
PegSat
1 20546U 90 28 A 93288.10417125 .00008815 00000-0 23346-3 0 5031
2 20546 94.1206 160.4969 0083355 147.8977 212.7330 15.34849867194617
HST
1 20580U 93288.29893929 .00001056 00000-0 92329-4 0 3979
2 20580 28.4713 10.0850 0004180 226.9422 133.0818 14.92869856189477
MACSAT 2
1 20608U 90 43 B 93285.74320920 .00000325 00000-0 55171-4 0 9023
2 20608 89.9256 181.8045 0104072 235.6039 123.5302 14.64571136183068
Glonass 44
1 20619U 90 45 A 93287.54855753 -.00000022 00000-0 00000+0 0 9126
2 20619 65.3350 357.3243 0026229 213.2289 146.6669 2.13102909 26516
Glonass 45
1 20620U 90 45 B 93287.19777720 -.00000022 00000-0 00000+0 0 9081
2 20620 65.3287 357.3307 0005468 41.0889 319.0110 2.13102802 26523
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1 20621U 90 45 C 93262.39032552 -.00000022 00000-0 99999-4 0 4034
2 20621 65.3555 358.2080 0014286 197.5280 162.4604 2.13101028 25997
Kristall
1 20635U 90 48 A 93287.85243092 .00031432 00000-0 41144-3 0 5052
2 20635 51.6194 338.2443 0006514 309.0587 50.8302 15.58294356437795
ROSAT
1 20638U 90 49 A 93285.44316120 .00001496 00000-0 11935-3 0 2028
2 20638 52.9868 24.1117 0013921 44.8097 315.4014 15.06415775184724
Meteor 2-19
1 20670U 90 57 A 93284.85954447 .00000096 00000-0 81070-4 0 7025
2 20670 82.5464 45.7127 0017111 120.8594 239.4252 13.84178556166268
CRRES
1 20712U 93288.03664061 .00000281 00000-0 33069-3 0 7564
2 20712 18.0232 288.6779 7194222 4.4826 359.5445 2.34801859 20117
GPS BII-08
1 20724U 90 68 A 93286.78140782 .00000014 00000-0 99999-4 0 7029
2 20724 54.6915 147.8629 0104188 155.0575 205.6234 2.00563380 23390
Feng Yun1-2
1 20788U 90 81 A 93287.99948046 .00000299 00000-0 22124-3 0 8051
2 20788 98.8532 310.7800 0014848 339.5002 20.5586 14.01308633159367
Meteor 2-20
1 20826U 90 86 A 93286.20117621 .00000096 00000-0 81888-4 0 7023
2 20826 82.5269 342.4946 0014066 25.5065 334.6787 13.83560871153609
GPS BII-09
1 20830U 90 88 A 93285.33535972 .00000000 00000-0 99999-4 0 7023
2 20830 55.3445 90.2013 0070255 106.4484 254.3564 2.00555454 22454
GPS BIIA-10
1 20959U 90103 A 93285.74552002 .00000014 00000-0 99999-4 0 6014
2 20959 54.9198 149.7437 0076176 222.5350 136.9703 2.00573336 21049
DMSP B5D2-5
1 20978U 90105 A 93288.04676737 .00009117 00000-0 32714-2 0 3059
2 20978 98.7212 345.7449 0079843 164.4919 195.9375 14.32312316150009
Glonass 47
1 21006U 90110 A 93286.82381487 .00000015 00000-0 00000+0 0 5103
2 21006 64.9020 117.6686 0060339 185.8152 174.1930 2.13102522 22184
Glonass 48
1 21007U 90110 B 93287.47717788 .00000015 00000-0 00000+0 0 6092
2 21007 64.9219 117.7057 0037687 177.3889 182.6986 2.13101024 22205
Glonass 49
1 21008U 90110 C 93286.89368510 .00000015 00000-0 00000+0 0 6093
2 21008 64.9042 117.6882 0007535 281.0287 78.9532 2.13099670 22183
INFORMTR-1
1 21087U 93288.23064405 .00000021 00000-0 15443-4 0 3541
2 21087 82.9459 323.9958 0036622 48.3736 312.0546 13.74525495135933
Cosmos 2123
1 21089U 91 7 A 93285.72497418 .00000142 00000-0 13846-3 0 6029
2 21089 82.9243 194.9512 0030810 77.1277 283.3318 13.74028313134664
MOP-2
1 21140U 91 15 B 93284.96435667 .00000023 00000-0 99999-4 0 6010
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2 21140 0.2513 32.0324 0000097 329.2487 4.0404 1.00362320 4492
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1 21152U 91 19 A 93288.01214683 .00000038 00000-0 34099-4 0 7039
2 21152 82.9255 148.8101 0041588 176.1006 184.0485 13.73487531129738
Glonass 50
1 21216U 91 25 A 93264.31731870 -.00000022 00000-0 99999-4 0 639
2 21216 65.0729 357.9835 0010645 210.9470 149.0279 2.13103556 19213
Glonass 51
1 21217U 91 25 B 93287.37507896 -.00000022 00000-0 99999-4 0 5095
2 21217 65.0828 357.1892 0012436 234.0599 125.8857 2.13101537 19703
Glonass 52
1 21218U 91 25 C 93262.61973575 -.00000022 00000-0 99999-4 0 9507
2 21218 65.0770 358.0273 0007780 297.3487 62.6354 2.13102458 19171
GRO
1 21225U 91 27 B 93285.08533536 .00084122 00000-0 66679-3 0 2033
2 21225 28.4598 162.7040 0031127 47.7376 312.5833 15.69139089 18553
Meteor 3-4
1 21232U 91 30 A 93287.22970807 .00000043 00000-0 99999-4 0 6035
2 21232 82.5432 343.4821 0014836 82.2352 278.0453 13.16455196118993
NOAA 12
1 21263U 91 32 A 93286.77520452 -.00001807 00000-0 -80439-3 0 8050
2 21263 98.6474 314.6741 0012266 228.2203 131.8070 14.22316336125498
OKEAN 3
1 21397U 91 39 A 93287.15752097 .00000503 00000-0 70984-4 0 9023
2 21397 82.5235 324.4333 0022962 345.4333 14.6213 14.76036882127212
GPS BIIA-11
1 21552U 91 47 A 93285.02015523 -.00000001 00000-0 99999-4 0 6012
2 21552 55.4923 87.7967 0045352 230.6277 129.0478 2.00570064 16625
ERS-1
1 21574U 93287.03700184 .00000007 00000-0 99999-5 0 9684
2 21574 98.5454 0.1102 0000918 94.6106 265.5178 14.32245849117425
UO-22
1 21575U 91 50 B 93285.23553413 .00000131 00000-0 51258-4 0 4027
2 21575 98.4589 359.4059 0007231 316.6360 43.4257 14.36856146117477
ORBCOMM-X
1 21576U 91 50 C 93286.18126722 .00000139 00000-0 54638-4 0 5026
2 21576 98.4589 359.4387 0003515 327.2661 32.8312 14.36241193117558
TUBSAT
1 21577U 91 50 D 93287.69298351 .00000060 00000-0 27580-4 0 4020
2 21577 98.4599 1.3068 0005950 312.6543 47.4141 14.36397493117794
SARA
1 21578U 91 50 E 93287.25031151 .00000506 00000-0 17892-3 0 6027
2 21578 98.4660 3.0116 0004377 314.1236 45.9591 14.38542803117842
TDRS 4
1 21639U 91 54 B 93285.42596889 .00000109 00000-0 00000+0 0 6028
2 21639 0.0357 312.4212 0000680 328.1901 79.4364 1.00273966 6105
Meteor 3-5
1 21655U 91 56 A 93285.20994771 .00000043 00000-0 99999-4 0 6023
2 21655 82.5547 291.8713 0014636 96.3433 263.9392 13.16825416103826
UARS
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1 21701U 91 63 B 93265.74981556 .00003040 00000-0 28906-3 0 2561
2 21701 56.9838 150.5436 0004504 78.1255 282.0293 14.96107390110904
DMSP B5D2-6
1 21798U 93286.73158507 -.00002762 00000-0 -14516-2 0 9573
2 21798 98.9583 287.0580 0013787 113.9203 246.3450 14.13716747 96792
Glonass 53
1 21853U 92 5 A 93262.36355644 .00000015 00000-0 99999-4 0 6557
2 21853 64.8356 118.2285 0006494 196.8420 163.2305 2.13102389 12779
Glonass 54
1 21854U 92 5 B 93287.05790675 .00000015 00000-0 00000+0 0 8099
2 21854 64.8522 117.3782 0016226 20.4679 339.6688 2.13103077 13295
Glonass 55
1 21855U 92 5 C 93287.11802404 .00000015 00000-0 00000+0 0 8080
2 21855 64.8522 117.3853 0007177 191.7490 168.3029 2.13102036 13282
JERS-1
1 21867U 93288.18236751 .00308466 00000-0 24456-1 0 1101
2 21867 97.6698 2.5038 0003001 40.8241 318.7890 14.98872348 91686
GPS BIIA-12
1 21890U 92 9 A 93285.97183037 -.00000006 00000-0 99999-4 0 4019
2 21890 54.2847 266.9255 0057202 159.2494 200.9743 2.00563253 12012
GPS BIIA-13
1 21930U 92 19 A 93287.17985853 -.00000025 00000-0 99999-4 0 4027
2 21930 55.4882 27.6756 0061643 162.7836 197.4370 2.00562220 10972
EUVE
1 21987U 92 31 A 93283.34258985 .00089649 00000-0 42714-2 0 2024
2 21987 28.4336 289.3217 0010138 118.1378 241.8195 15.17638587 74382
SAMPEX
1 22012U 92 38 A 93285.41507552 .00003589 00000-0 30865-3 0 4024
2 22012 81.6676 71.8207 0119781 126.1930 235.0437 14.91679738 69371
GPS BIIA-14
1 22014U 92 39 A 93285.72184244 .00000012 00000-0 99999-4 0 3010
2 22014 54.9215 207.6090 0083546 292.1019 67.0248 2.00574939 2773
Glonass 56
1 22056U 92 47 A 93287.48817698 -.00000022 00000-0 00000+0 0 7089
2 22056 64.9172 357.4203 0006298 257.1570 102.8330 2.13103186 9373
Glonass 57
1 22057U 92 47 B 93287.31255464 -.00000022 00000-0 00000+0 0 7089
2 22057 64.9345 357.4404 0007377 305.9324 54.0598 2.13102659 9364
Glonass 58
1 22058U 92 47 C 93286.78446550 -.00000022 00000-0 00000+0 0 7077
2 22058 64.9332 357.4663 0011124 270.1724 89.7600 2.13103125 9391
TOPEX
1 22076U 92 52 A 93285.92916668 -.00000001 00000-0 99999-4 0 6548
2 22076 66.0395 84.5818 0007773 266.1188 93.8930 12.80930728 54829
KITSAT-A
1 22077U 92 52 B 93277.90505412 .00000000 00000-0 99999-4 0 1160
2 22077 66.0854 94.4749 0002436 359.6011 0.5005 12.86280687 53956
S80/T
1 22078U 92 52 C 93287.76342918 .00000000 00000-0 99999-4 0 3012
2 22078 66.0835 73.3761 0004086 8.4078 351.7009 12.86562466 55282
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1 22079U 92 52 D 93267.89548657 -.00000002 00000-0 99999-4 0 1328
2 22079 66.0721 128.1662 0073422 314.0893 45.4091 12.77664486 52456
GPS BIIA-15
1 22108U 92 58 A 93285.68463142 -.00000007 00000-0 99999-4 0 3012
2 22108 54.5040 267.5832 0104218 132.1685 228.7167 2.00567917 7959
FREJA
1 22161U 92 64 A 93285.74485640 .00000489 00000-0 27766-3 0 3028
2 22161 63.0128 198.5307 0773679 293.3075 58.8351 13.21678235 49095
LAGEOS II
1 22195U 92 70 B 93287.38919769 -.00000004 00000-0 99999-4 0 2029
2 22195 52.6582 249.0322 0136759 10.0569 350.2688 6.47295572 23029
GPS BIIA-16
1 22231U 92 79 A 93284.87312597 .00000012 00000-0 99999-4 0 3014
2 22231 54.7705 208.8855 0039377 295.7650 63.8383 2.00568266 6528
GPS BIIA-17
1 22275U 92 89 A 93287.00654698 .00000012 00000-0 99999-4 0 3023
2 22275 54.7001 206.3387 0054860 256.6373 102.7845 2.00569108 5969
TDRS 5
1 22314U 93 3 B 93284.19554351 -.00000203 00000-0 99999-4 0 3030
2 22314 0.5547 70.7457 0002704 192.9441 96.3080 1.00559194 2820
GPS BIIA-18
1 22446U 93 7 A 93285.08719123 -.00000029 00000-0 99999-4 0 3013
2 22446 54.7800 327.4472 0067620 335.7465 24.0026 2.00556014 4952
Glonass 59
1 22512U 93 10 A 93287.23470557 .00000015 00000-0 12645-3 0 4089
2 22512 64.8637 117.2356 0008861 188.4144 171.6396 2.13101615 4889
Glonass 60
1 22513U 93 10 B 93287.17553165 .00000015 00000-0 00000+0 0 4066
2 22513 64.8596 117.2493 0007094 182.9474 177.1199 2.13102624 5084
Glonass 61
1 22514U 93 10 C 93287.41068651 .00000015 00000-0 00000+0 0 4087
2 22514 64.8668 117.2293 0013899 184.8382 175.2162 2.13101784 5087
ASTRO-D
1 22521U 93 11 A 93288.05282793 .00001380 00000-0 11599-3 0 2030
2 22521 31.1018 174.9671 0077299 218.6214 140.8865 14.92638444 35422
UHF F1
1 22563U 93 15 A 93279.72394214 -.00000147 00000-0 99999-4 0 2016
2 22563 27.0835 303.4564 0007614 263.9193 188.7421 0.99251013 271
GPS BIIA-19
1 22581U 93 17 A 93279.25177862 -.00000026 00000-0 99999-4 0 2010
2 22581 54.9859 27.8778 0041836 35.1786 325.1294 2.00555962 3857
ProgressM17
1 22588U 93 19 A 93287.26457216 .00007674 00000-0 73031-4 0 3085
2 22588 51.6211 338.0524 0003034 219.9507 140.0935 15.67040875 30762
ARSENE
1 22654U 93 31 B 93282.56758711 -.00000050 00000-0 99999-4 0 2010
2 22654 1.3450 116.0755 2933466 157.4440 219.9134 1.42201061 2195
GPS BIIA-20
1 22657U 93 32 A 93285.36418536 -.00000026 00000-0 99999-4 0 2016
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2 22657 55.0594 27.4049 0058871 200.0635 159.7183 2.00574751 6666
GPS BIIA-21
1 22700U 93 42 A 93285.83311813 -.00000007 00000-0 99999-4 0 2017
2 22700 54.6779 268.2791 0025423 298.3146 61.4207 2.00569236 2112
Soyuz TM-17
1 22704U 93 43 A 93287.91654823 .00030971 00000-0 40548-3 0 2055
2 22704 51.6194 337.9224 0006532 309.6053 50.2123 15.58297981437805
NOAA 13
1 22739U 93286.42502684 -.00000186 00000-0 -93322-4 0 803
2 22739 98.9161 227.1712 0010899 95.4700 264.7199 14.10855321 9167
ProgressM19
1 22745U 93 52 A 93285.73610233 .00051391 00000-0 66820-3 0 2044
2 22745 51.6191 348.8630 0006223 298.5919 61.4272 15.58245648 9619
GPS BIIA-22
1 22779U 93 54 A 93287.41171676 -.00000029 00000-0 99999-4 0 2039
2 22779 54.9028 327.2626 0027517 225.6109 134.2509 2.00552290 911
Meteor 2-21
1 22782U 93 55 A 93286.73557409 .00000094 00000-0 80089-4 0 2020
2 22782 82.5482 41.7313 0022204 192.7322 167.3281 13.82987190 6021
Cosmos 2263
1 22802U 93287.30370471 -.00000024 00000-0 00000+0 0 2021
2 22802 70.8737 97.0912 0114852 177.6108 258.6402 14.21159091 3954
1993 059B
1 22803U 93 59 B 93285.45325714 .00000071 00000-0 46365-4 0 2022
2 22803 70.9869 100.9910 0019142 229.6736 130.2741 14.15789471 3703
1993 059C
1 22804U 93 59 C 93285.97434357 .00000055 00000-0 70330-4 0 2025
2 22804 70.9800 103.8213 0214589 33.2784 328.1641 13.69332069 3657
1993 059D
1 22805U 93 59 D 93285.62987463 .00000129 00000-0 16253-3 0 2024
2 22805 70.9752 104.5460 0216881 58.2700 303.9337 13.68250779 3590
1993 059E
1 22806U 93 59 E 93285.93859513 .00000138 00000-0 16517-3 0 2026
2 22806 71.0224 104.3642 0204074 35.0054 326.4272 13.71178058 3640
1993 059F
1 22807U 93 59 F 93285.96389227 -.00000103 00000-0 -84346-4 0 2020
2 22807 71.0191 104.4144 0209464 58.1765 303.9562 13.69865067 3658
Cosmos 2264
1 22808U 93 60 A 93288.11582709 .00000463 00000-0 99999-5 0 2155
2 22808 65.0207 306.7741 0011314 276.1924 83.8940 15.52026985 4369
SPOT 3
1 22823U 93288.30019630 .00000255 00000-0 13721-3 0 2418
2 22823 98.7428 1.1628 0001467 111.1427 248.9907 14.20031541 2721
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1 22824U 93 61 B 93285.69412903 .00000124 00000-0 59012-4 0 2023
2 22824 98.6826 358.6626 0005694 202.5200 157.5730 14.27093428 2369
KO-25
1 22825U 93 61 C 93285.75852196 .00000108 00000-0 52220-4 0 2029
2 22825 98.6768 358.7223 0007582 207.9609 152.1156 14.27584304 2371
POSAT-1
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1 22826U 93 61 D 93285.89749859 -.00000738 00000-0 -29118-3 0 2037
2 22826 98.6800 358.8662 0008357 209.4671 150.6040 14.27683559 2405
HEATHSAT
1 22827U 93 61 E 93284.70497112 -.00000962 00000-0 -38142-3 0 2024
2 22827 98.6757 357.6771 0009011 196.9905 163.0975 14.27784264 2223
ITAMSAT
1 22828U 93 61 F 93286.17661478 .00000247 00000-0 11580-3 0 2038
2 22828 98.6770 359.1377 0009083 193.0438 167.0509 14.27788026 2447
EYESAT-1
1 22829U 93 61 G 93286.45464408 -.00000675 00000-0 -26396-3 0 2032
2 22829 98.6757 359.4183 0010287 192.1840 167.9104 14.27974280 2489
1993 061H
1 22830U 93 61 H 93286.24408072 .00000388 00000-0 17241-3 0 2034
2 22830 98.5818 359.0811 0011764 176.3255 183.8015 14.28008897 2455
1993 062A
1 22836U 93 62 A 93287.46789015 -.00000157 00000-0 99999-4 0 2064
2 22836 1.4752 276.3833 0006197 35.3099 324.0599 1.00276397 148
1993 062D
1 22839U 93 62 D 93275.48055833 -.00000166 00000-0 99999-4 0 35
2 22839 1.5146 277.0097 0016517 328.2473 28.3330 1.00155262 27
1993 063A
1 22859U 93287.21654670 .00338736 16222-4 25405-3 0 2209
2 22859 56.9474 64.8715 0059872 150.4154 210.0456 16.10693192 944
1993 063B
1 22860U 93 63 B 93287.82629465 .00794062 52811-4 44332-3 0 2171
2 22860 56.9454 61.8513 0046384 150.0403 210.2241 16.16096655 1047
1993 063C
1 22861U 93 63 C 93284.34879444 .08519325 51716-4 51622-2 0 2043
2 22861 56.7086 79.1275 0124877 146.8512 219.0610 16.02385567 484
1993 063D
1 22862U 93 63 D 93284.34063319 .10810573 52250-4 60038-2 0 2047
2 22862 56.5909 79.1614 0096300 154.3399 211.4754 16.08630901 486
1993 063E
1 22863U 93 63 E 93284.25991304 .54845850 55591-4 13203-2 0 2094
2 22863 57.2146 79.0325 0040196 162.2659 200.8827 16.40878673 473
1993 063F
1 22864U 93 63 F 93283.57123423 .15739944 52959-4 53852-2 0 2089
2 22864 57.1727 82.3030 0075439 169.5365 191.4161 16.17530543 369
1993 063G
1 22865U 93 63 G 93282.67489321 .27898328 55221-4 31594-2 0 23
2 22865 56.9429 86.3583 0020588 149.7129 213.9961 16.35502399 205
1993 064A
1 22867U 93 64 A 93287.91655989 .00017252 00000-0 22926-3 0 114
2 22867 51.6194 337.9225 0006678 308.8662 51.0105 15.58285195 487
1993 064B
1 22868U 93 64 B 93286.72683251 .18294785 60760-4 37421-3 0 123
2 22868 51.6366 343.5585 0005833 94.1257 266.1802 16.46677280 300
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tkelso@afit.af.mil Air Force Institute of Technology
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290. Satellite tv: HELPPPP!!!!

Newsgroup: rec.radio.amateur.space
Date: 1993-10-16 11:23:13 UTC
From: earvargh@reading.ac.uk
Message-ID: <Pine.3.07.9310161227.C26236-8100000@suma1>
Source record: 28499
Cross-posted to: rec.radio.amateur.space,rec.video

Hi Folks,

I am looking for any info/earlier articles on the satellite television
boom in India and also on impact on audiences..

Can somebody tell me how to get them or give me a few pointers.

Thanks in advance
Korula

291. Re: Weather Sat Info Needed

Newsgroup: rec.radio.amateur.space
Date: 1993-10-16 20:57:29 UTC
From: nlewis@terapin.com
Message-ID: <nlewis.0r35@terapin.com>
Source record: 28501

randyh@gvgadg.gvg.tek.com (Randy Hall) writes:

>I am thinking about receiving weather satellite pictures from the NOAA
>series birds on 137 MHz. I think I am all set on the receiving end, but
>need some ideas for the decoder of the 2400 Hz tone into pictures. Seems
>like someone must sell a simple decoder that would connect to a PC
>(Mac would be neat as well) that would decode and display on the computer's
>screen. Does anyone know of such a converter? A simple kit with software
would
>
>be great.
>
>If anyone has any ideas, please pass them on. Also any Telnet or FTP sites
>with info would also be useful.
>
>Thanks,
>
>Randy
>WA2AGE
>
I built my own converter, and wrote some software to display the APT pictures.
I basically used the A to D converter circuit in the Weather Satellite Handbook
from ARRL. All the timing is done by the software, and if you record the
passes on the audio of a VCR, you will not need any fancy clock circuit or PLL.
I used a sampling rate of 4096 in order to display the NOAA pictures in SVGA
1024x768 in 256 shades of grey. If you have the patience to go through all of
this, I think you will find the results more satisfying than buying a converter
and software. The software is a bit tricky, and you will need to write a fair
bit of it in assembly language for speed. You will also need a way to hook up
your a/d chip to your computer. You can build a simple interface circuit using
the 8255 PPI (programmable peripheral interface). I do a lot of signal
processing, and use a parallel digital I/O board from Keithley Metrabyte (800
) 348-0033. The I/O board is really just the PPI with addressing and
buffering.
If you want to buy a demodulator w/ software, they are available from
several companies: SSC (714) 498-5784, OFS (919) 847-4545, Multifax (315)
986-2719 are a few. I cannot say which products are good because I didn't go
that route...

292. ANS-289 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-10-17 17:32:15 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-289.01@ampr.org>
Source record: 28502
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-289.01
STS-58 LAUNCH SET AGAIN

HR AMSAT NEWS SERVICE BULLETIN 289.01 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 16, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-289.01

After Two Launch Attempts, STS-58 WILL TRY AGAIN 18-OCT-93!

The 3rd launch attempt of STS-58 is now scheduled for Monday, 18-OCT-93
at 14:53 UTC. The following are the preliminary keplerian elements to be
used.

STS-58
1 00058U 93291.67747791 .00119475 00000-0 26040-3 0 77
2 00058 39.0114 128.6088 0007676 272.4217 87.5676 15.96123499 27

Satellite: STS-58
Catalog number: 00058
Epoch time: 93291.67747791 = (18-OCT-93 16:15:34.09 UTC)
Element set: 007
Inclination: 39.0114 deg
RA of node: 128.6088 deg Space Shuttle Flight STS-58
Eccentricity: .0007676 Prelaunch Element set JSC-007
Arg of perigee: 272.4217 deg Launch: 18-OCT-93 14:53 UTC
Mean anomaly: 87.5676 deg
Mean motion: 15.96123499 rev/day Gil Carman (WA5NOM)
Decay rate: 1.19475e-03 rev/day~2 NASA Johnson Space Center
Epoch rev: 2
Checksum: 331

Space Shuttle Columbia's planned launch has been postponed until Monday,
18-OCT-93. The scheduled launch time begins at 10:53 EDT. One of 2 S-Band
transponders used for air-to-ground communications failed during pre-flight
checks on the second launch attempt 15-OCT-93. Engineers reported a solid
state failure in the receiver unit. Also contributing to the delay was the
lack of favorable weather conditions.

STS-58 Shuttle Amateur Radio Experiment (SAREX) Information Sheet:

Mission: STS-58 Space Shuttle Columbia
Spacelab Life Sciences-2 (SLS-2) Mission

Launch: October 18, 1993, 14:53 UTC

Orbit: 39 degrees orbital inclination

Mission Length: 13 days (Nominal)

Amateur Radio
Operators: Bill McArthur (KC5ACR), Marty Fettman (KC5AXA),
Rick Searfoss (KC5CKM)

Modes: FM Voice
Prime callsign KC5ACR

Packet Radio
Callsign W5RRR-1

Frequencies: All operations in split mode. Do not transmit on
the downlink frequency of 145.550 MHz.

Voice Freqs: Downlink: 145.55 MHz (Worldwide)
Uplinks: 144.91, 144.93, 144.95, 144.97, 144.99 MHz
(Except Europe)
144.70, 144.75, 144.80 MHz (Europe only)

Note: The crew will not favor any specific uplink
frequency, so your ability to work the crew will
be the "luck of the draw."

Packet Freqs: Downlink: 145.55 MHz
Uplink: 144.49 MHz

Info: Goddard Amateur Radio Club, WA3NAN, Greenbelt Maryland,
SAREX Bulletins and Shuttle Retransmissions
3.860 MHz, 7.185 MHz, 14.295 MHz, 21.395 MHz, 28.650 MHz
and 147.450 MHz (FM)

Johnson Space Center ARC, W5RRR, Houston, Texas
SAREX Bulletins 7.225 MHz, 14.280 MHz, 21.395 MHz,
28.650 MHz, (SSB) and 146.64 MHz (FM)

ARRL Amateur Radio Station, W1AW, Newington, CT
SAREX News Bulletins
3.990, 7.290, 14.290, 18.160, 21.390, and 28.590 MHz
and 147.555 MHz (FM)

Also, bulletins available on internet, via AMSAT ANS,
Compuserve, and your local PBSS.

School Group Participation: 18 school groups will participate
in SAREX with pre-scheduled direct
and telebridge contacts. These include
17 in the U.S., and one France.

[The AMSAT News Service (ANS) would like to thank Frank Bauer (KA3HDO) for
this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-289.02

AO-13 ECLIPSE SEASON APPROACHES

HR AMSAT NEWS SERVICE BULLETIN 289.02 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 16, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-289.02

G3IOR Provides Information About Sun/Moon Eclipses For AO-13

During the course of the year as AO-13 makes its way around the Earth in its highly elliptical orbit, there will be a few Earth-Moon-Sun "geometries" which will cause AO-13 to experience either partial or complete darkness because of the Earth or the Moon obscuring AO-13's view of the Sun. For most "Low-Earth-Orbiting" (LEO) satellites, many OSCAR users are aware that they experience eclipes daily for varying periods during each orbit. But for AO-13, these eclipse periods come only during certain times in the year and not only are Ground Controllers aware of these times, but every user of AO-13 should also be aware of the eclipse seasons. G3IOR predicts that the next lunar eclipse will occur on 13-NOV-93 beginning at 13:33 UTC and ending at 15:13 UTC. AO-13 will not experience total darkness during this lunar eclipse since the Moon will only obscure AO-13 from the Sun by 89% at its peak. The peak of this eclispe, or the maximum darkness, will occur at 14:16 UTC. For those AO-13 telemetry gathering enthusiasts, you can monitor the General Telemetry Beacon on a downlink frequency of 145.812 MHz or 2400.646 MHz. Only stations on the west coast of the U.S., Pacific, Australia, and Japan will have visibility to AO-13 during this lunar eclipse. Since most of this lunar eclipse will happen during a Mode-S transponder period, there will be no adjustment made to the transponder schedule. G3IOR says that this is because Mode-S draws very little power during its operation. Using any recent set of keplerian elements in InstantTrak V1.00b, it appears that at 13:33 UTC the Mean Anomaly (MA) count for AO-13 will be 171; at the peak of the lunar eclipse (89% obscuration) at 14:16 UTC the AO-13 will be at MA 187. The end of the eclipse will be around MA 209 at 15:13 UTC on 13-NOV-93. This puts the start of the lunar eclispe in Mode-BS, then the rest of the eclipse period either with the Mode-S transponder in operation or Mode-S beacon only operation. Those wishing to collect telemetry should be prepared to move to Mode-S during this period. Please take note of the following AO-13 transponder operating schedule which covers the lunar eclipse period:

M QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Oct 25-Nov 15
Mode-B : MA 0 to MA 130 !
Mode-BS : MA 130 to MA 180 !
Mode-S : MA 180 to MA 205 !<- S transponder; B trsp. is OFF
Mode-S : MA 205 to MA 210 !<- S beacon only
Mode-BS : MA 210 to MA 226 ! Blon/Blat 210/0
Omnis : MA 240 to MA 80 ! Move to attitude 240/0, Nov 15
Please don't uplink to Mode-B between MA 180-205 as this interferes with Mode-S transponder operations.

As far as situation where the Earth blocks the Sun from AO-13, these solar eclipses will begin on 07-DEC-93 and continue until 24-DEC-93. Because the length of eclipse periods can be quite long, a special transponder schedule will be implemented during this time period. The following schedule is designed to take these solar eclipse periods into account.

L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 220 ! \ minutes.
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 226 ! Blon/Blat 240/0
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
Please don't uplink to Mode-B between MA 220-230 as this interferes with Mode-S transponder operations.

G3IOR encourages those who wish to monitor a particular telemetry parameter during these solar eclipse periods, should let him know since he will make sure that parameter is part of the Whole Orbit Data (W0D) collection facility.

[The AMSAT News Service (ANS) would like to thank James Miller (G3IOR) for the information which went into this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-289.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 289.03 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 16, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-289.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

23-Oct-93 1315 B 154 WB6LLO WA5ZIB
30-Oct-93 1300 B 62 W5IU WB6LLO
13-Nov-93 1230 B 146 VE2LVC W5IU

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink
on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-289.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 289.04 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 16, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-289.04

Weekly OSCAR Status Reports: 16-OCT-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Aug 25-Oct 25
Mode-B : MA 0 to MA 90 !
Mode-BS : MA 90 to MA 120 !
Mode-S : MA 120 to MA 145 !<- S transponder; B trsp. is OFF
Mode-S : MA 145 to MA 150 !<- S beacon only
Mode-BS : MA 150 to MA 180 ! Blon/Blat 180/0
Mode-B : MA 180 to MA 256 !
Omnis : MA 230 to MA 40 ! Move to attitude 210/0, Oct 25

M QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Oct 25-Nov 15
Mode-B : MA 0 to MA 130 !
Mode-BS : MA 130 to MA 180 !
Mode-S : MA 180 to MA 205 !<- S transponder; B trsp. is OFF
Mode-S : MA 205 to MA 210 !<- S beacon only
Mode-BS : MA 210 to MA 226 ! Blon/Blat 210/0
Omnis : MA 240 to MA 80 ! Move to attitude 240/0, Nov 15
Please don't uplink to Mode-B between MA 180-205 as this interferes with
Mode-S transponder operations. Reorientation from Attitude 180/0 to 210/0:
A magnetorque will be initiated on Orbit #4105 MA 224 [Oct 24 @ 03:48 UTC]
and will be executed over 4 perigees, completing on Orbit #4109 MA 32 [Oct
25 @ 17:00 UTC]. The new schedule, as per M-block, will be invoked Orbit
#4109 MA 140, and thus that orbit (only) will contain two Mode-S sessions.
Continuous up-to-date information about AO-13 operations is always avail-
able on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps
PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins,
Packet, PACSATs, etc., and can also be found in many international news-
letters. [G3RUH/DB2OS/VK5AGR]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

KO-23: Up and running. Busy as usual. The images are no longer avail-
able. [WH6I]

KO-25: Has been in "TICK" mode lately. [WH6I]

RS-12: W9CGI reports that he had his first satellite contact through RS-12 a couple of weeks ago on Mode-K, i.e., 15M uplink and 10M downlink. He reports that he made about 4 contacts altogether, on two different passes. W9CGI would appreciate any ideas/filter or thoughts, etc. from any other RS-12 users on how to keep the 15M uplink out of his 10M receiver so that he can run duplex like any other mode bird. He uses a Yaesu FT990 at about 10W on 15M uplink to a Cushcraft R5 vertical. For the downlink he has a vertical J-pole about 60 ft from the R5 antenna and then inside he uses a HF converter in the FT726 transceiver. The FT726 is of course his normal Mode-B rig. W9CGI says that he is finally finding time to get back on the birds so he is looking forward to making many contacts.
[W9CGI @ N5AAA.IN.USA]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

293. STS-58 Keps (Orbit 58)

Newsgroup: rec.radio.amateur.space
Date: 1993-10-25 22:35:00 UTC
From: cowdin@wa8ure.#swmi.mi.usa.na
Message-ID: <9310242336.a@ve3euk.bbs>
Source record: 28503
Cross-posted to: rec.radio.amateur.space,rec.radio.info

STS-58 Keps (Orbit 58)

STS-58 element set JSC-010 (orbit 53)

STS-58
1 22869U 93 65 A 93294.86836529 .00191327 00000-0 25999-3 0 108
2 22869 39.0211 107.4394 0004523 319.1598 40.8836 15.96428488 535

Satellite: STS-58
Catalog number: 22869
Epoch time: 93294.86836529 = (21 OCT 93 20:50:26.76 UTC)
Element set: 010
Inclination: 39.0211 deg
RA of node: 107.4394 deg Space Shuttle Flight STS-58
Eccentricity: .0004523 Keplerian Element set JSC-010
Arg of perigee: 319.1598 deg from NASA flight Day 4 vector
Mean anomaly: 40.8836 deg
Mean motion: 15.96428488 rev/day G. L. Carman
Decay rate: 1.91327e-03 rev/day~2 NASA Johnson Space Center
Epoch rev: 53
Checksum: 331

G.L.CARMAN

**************************** STS-58 STATE VECTOR**************************

FLIGHT DAY 5 STATE VECTORS
ON ORBIT OPERATIONS
(Posted 10/22/93 by Roger Simpson)

The following vector for the flight of STS-58 is provided by NASA Johnson
Space Center, Flight Design and Dynamics Division for use in ground track
plotting programs. The vector represents the trajectory of Columbia
during on orbit operations.

Lift off Time : 1993/291/14:53:09.974
Lift off Date : 10/18/93

Vector Time (GMT) : 295/14:00:00.00
Vector Time (MET) : 003/23:06:50.030
Orbit Count : 64
Weight : 242925.0 LBS
Drag Coefficient : 2.00
Drag Area : 3000.0 SQ FT

M50 Elements Keplerian Elements
---------- ----------
X = -2637440.4 FT A = 3600.1079 NM
Y = -20942782.5 FT E = 0.001033
Z = 5675641.8 FT I (M50) = 39.27150 DEG
Xdot = 19697.390013 FT/S Wp (M50) = 113.55002 DEG
Ydot = -6469.479637 FT/S RAAN (M50) = 102.02088 DEG
Zdot = -14650.898454 FT/S / N (True) = 42.23202 DEG
Anomalies \ M (Mean) = 42.15251 DEG

Ha = 155.421 NM
Hp = 150.294 NM

Mean of 1950 (M50) : Inertial, right-handed Cartesian system whose
Coordinate System origin is the center of the earth. The epoch
is the beginning of the Besselian year 1950.
X axis: Mean vernal equinox of epoch
Z axis: Earth's mean rotational axis of epoch
Y axis: Completes right-hand system
A: Semi-major axis
E: Eccentricity N: True anomaly
I: Inclination M: Mean anomaly
Wp: Argument of perigee Ha: Height of apogee
RAAN: Right ascension of ascending node Hp: Height of perigee

Columbia will perform a 14 fps retrograde orbit adjust maneuver at
5/06:50 MET. The next state vector update will be performed after this
maneuver has been completed.

Questions regarding these postings may be addressed to Roger Simpson,
Mail Code DM4, L. B. J. Space Center, Houston, Texas 77058,

POSTED BY SSTICH AT VMSPFHOU ON VMSPFHOU.VMBOARDS:PAONEWS

Ron Pogue (KD9QB) Primary Internet Address: a66rmp%andv02@gmr.com
CIS: 71036,1001 AMSAT Internet Address: kd9qb@AmSat.org
Fax: 1-317-773-1463 (24Hrs) Alternate Internet Address: rpogue@gmr.com
Home: 1-317-773-4936 (7-9PM EST) Packet Address: kd9qb@wj9u.in.usa.na

294. SAREX Keps & Update 10/28

Newsgroup: rec.radio.amateur.space
Date: 1993-10-28 19:00:00 UTC
From: abfhb@wa8ure.#swmi.mi.usa.na
Message-ID: <$sts-58.025@ampr.org>
Source record: 28504
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.025
SAREX Keps & Update: 10/28

Thursday 10/28/93 @ 08:00 UTC

The last school group contact was completed yesterday. The Portsmouth HS in Portsmouth, New Hampshire had a telebridge contact using stations in California (Ralph Warner, N6MNN) and Texas (Bob Douglas, W5GEL). The students asked 5 questions during this bridge contact.

Hams across the U.S. and around the world continue to work the Shuttle Columbia on both voice and packet. Moreover, the completion of school group contacts has cleared several school backup passes for possible general QSO opportunities. While the SAREX Working Group cannot fully guarantee availability, there is a high probability that the STS-58 crew will be ready to take general calls over the continental U.S. on these passes. Two of these "scheduled" passes remain. These include orbit 178 at MET 11 days 1 hour 42 minutes (10/29 at 16:35 UTC) and orbit 192 at MET 11 days 22 hours and 29 minutes (10/30 at 13:22 UTC). Please note that the astronauts operated voice during yesterday's "scheduled" pass which occurred on 10/27 at 14:59 UTC (Orbit 145). Also note that hams on the ground heard or worked the Shuttle Columbia crew on several other orbits yesterday.

Element set GSFC-031, generated by Ron Parise, WA4SIR, is the official SAREX set for today. Please note that there is only a six second difference between element set GSFC-025 (released two days ago) and element set GSFC-031.

STS-58
1 22869U 93065A 93300.17699070 0.00133671 99048-5 24183-3 0 318
2 22869 39.0252 71.9896 0012817 34.2105 325.9529 16.00500857 1383

Satellite: STS-58
Catalog number: 22869
Epoch time: 93300.17699070 (27 OCT 93 04:14:51.** UTC)
Element set: GSFC-031
Inclination: 39.0252 deg
RA of node: 71.9896 deg Space Shuttle Flight STS-58
Eccentricity: 0.0012817 Keplerian Elements
Arg of perigee: 34.2105 deg
Mean anomaly: 325.9529 deg
Mean motion: 16.00500857 rev/day Semi-major Axis: 6651.1630 Km
Decay rate: 0.13E-02 rev/day*2 Apogee Alt: 281.30 Km
Epoch rev: 138 Perigee Alt: 264.25 Km

NOTE - This element set is based on NORAD element set # 031.
The spacecraft has been propagated to the next ascending
node, and the orbit number has been adjusted to bring it
into agreement with the NASA numbering convention.

Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group
/EX

295. SAREX Keps & Update 10/28

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 01:35:51 UTC
From: ABFHB@STDVAX.GSFC.NASA.GOV
Message-ID: <$sts-58.026@ampr.org>
Source record: 28505
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.026
SAREX Keps & Update 10/28

Thursday 10/29/93 @ 01:00 UTC

All scheduled SAREX school and personal contacts are complete. This mission was, by far, the most successful from a school group success standpoint. Only 2 school group and 1 personal contacts had to be repeated. The probability of a successful school contact on the first attempt was nearly 90% for this mission. During previous missions, our success rate was between 66-75% The majority of the schools had horizon to horizon contacts and many schools had 10 or more questions answered. The SAREX Working Group wishes to thank the school group volunteers for their outstanding efforts, the AMSAT technical mentors who coached the schools prior to the contact, and those who helped in the Mission Control Customer Support room; particularly John Nickel, WD5EEV, and Karen Nickel, WD5EEU.

Because all scheduled SAREX activities are now complete, several additional general QSO opportunities are now available. While the SAREX Working Group cannot fully guarantee that the crew will be operating, there is a high probability that the STS-58 astronauts will be ready to take general calls over the continental U.S. on these passes. A total of FOUR "scheduled" passes are now available. The two mentioned in previous bulletins include orbit 178 at MET 11 days 1 hour 42 minutes (10/29 at 16:35 UTC) and orbit 192 at MET 11 days 22 hours and 29 minutes (10/30 at 13:22 UTC). In addition, two other "scheduled" passes are now available. These include a pass on orbit 176 at MET 10 days 22 hours 18 minutes (10/28 at 13:11 UTC) and a pass on orbit 193 at MET 12 days 0 hours 6 minutes (10/30 at 14:49 UTC). Please note that many hams on the ground heard or worked the Shuttle Columbia crew on several orbits today.

Element set GSFC-031, generated by Ron Parise, WA4SIR, will continue to be the official SAREX element set. When last checked by Gil Carman, WA5NOM, there was less than a one second difference between the orbiter state vector and element set GSFC-031.

STS-58
1 22869U 93065A 93300.17699070 0.00133671 99048-5 24183-3 0 318
2 22869 39.0252 71.9896 0012817 34.2105 325.9529 16.00500857 1383

Satellite: STS-58
Catalog number: 22869
Epoch time: 93300.17699070 (27 OCT 93 04:14:51.** UTC)
Element set: GSFC-031
Inclination: 39.0252 deg

RA of node: 71.9896 deg Space Shuttle Flight STS-58
Eccentricity: 0.0012817 Keplerian Elements
Arg of perigee: 34.2105 deg
Mean anomaly: 325.9529 deg
Mean motion: 16.00500857 rev/day Semi-major Axis: 6651.1630 Km
Decay rate: 0.13E-02 rev/day*2 Apogee Alt: 281.30 Km
Epoch rev: 138 Perigee Alt: 264.25 Km

NOTE - This element set is based on NORAD element set # 031.
The spacecraft has been propagated to the next ascending
node, and the orbit number has been adjusted to bring it
into agreement with the NASA numbering convention.

Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group

/EX

296. Shuttle Rise-Set Times

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 01:47:51 UTC
From: ABFHB@STDVAX.GSFC.NASA.GOV
Message-ID: <$sts-58.027@ampr.org>
Source record: 28506
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.027
STS-58 Eastern R/S Times 10/29

Below are the rise and set times for STS-58 for selected US cities over the next four days. This data was generated to help hams without orbit programs to participate in the SAREX activities. Please note that the times shown are UTC and NOT LOCAL TIME. This listing includes only those passes with an elevation greater than 5 degrees. For information regarding SAREX frequencies and operations procedures, check your local PBBS, or bulletins from W1AW, W5RRR, W6VIO or WA3NAN.

STS-58 will be visible from mid northern latitudes for the next several mornings. If a shuttle pass occurs less than one hour before your local sunrise time, but before the morning twilight is too bright, the shuttle will appear as a bright star moving across the sky. If a pass occurs exactly one hour before sunrise, the orbiter may enter daylight while overhead, appearing suddenly out of the darkness.

*Landing is scheduled for 15:22 UTC on orbit 225 at Edwards Air Force Base, California. Data for orbit numbers greater than 225 is provided in the event that the mission is extended.

Symbol key: rise = time that shuttle appears above horizon
tca = time of closest approach to observer
set = time that shuttle disappears below horizon
el = maximium elevation above horizon
geo = geometry: A = Ascending orbit, moving south to north
D = Descending orbit, moving north to south
E = passes east of observer
W = passes west of observer

New York City STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 08:48:52 08:51:52 08:54 6 A-E 173
29Oct93 10:21:41 10:25:48 10:29 26 A-E 174
29Oct93 11:55:48 12:00:04 12:03 55 D-W 175
29Oct93 13:30:11 13:34:24 13:38 33 D-W 176
29Oct93 15:04:58 15:08:27 15:11 9 D-W 177

30Oct93 08:46:15 08:49:48 08:52 10 A-E 189
30Oct93 10:19:39 10:23:51 10:27 36 A-E 190
30Oct93 11:53:54 11:58:11 12:01 54 D-W 191
30Oct93 13:28:21 13:32:27 13:36 23 D-W 192
30Oct93 15:03:33 15:06:23 15:08 5 D-W 193

31Oct93 08:43:35 08:47:28 08:50 15 A-E 205
31Oct93 10:17:23 10:21:38 10:25 46 A-E 206
31Oct93 11:51:43 11:55:59 11:59 47 D-W 207
31Oct93 13:26:15 13:30:10 13:33 16 D-W 208

01Nov93 08:40:48 08:44:53 08:48 23 A-E 221
01Nov93 10:14:51 10:19:08 10:22 54 D-E 222
01Nov93 11:49:14 11:53:28 11:57 37 D-W 223
01Nov93 13:23:56 13:27:33 13:30 11 D-W 224

Washington D.C. STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 08:48:02 08:51:07 08:53 6 A-E 173
29Oct93 10:20:56 10:25:06 10:28 33 A-E 174
29Oct93 11:55:11 11:59:28 12:03 87 D-W 175
29Oct93 13:29:39 13:33:56 13:37 62 D-W 176
29Oct93 15:04:16 15:08:08 15:11 15 D-W 177

30Oct93 08:45:26 08:49:04 08:52 11 A-E 189
30Oct93 10:18:56 10:23:11 10:26 50 A-E 190
30Oct93 11:53:19 11:57:37 12:01 85 D-W 191
30Oct93 13:27:47 13:32:02 13:35 42 D-W 192
30Oct93 15:02:39 15:06:07 15:09 9 D-W 193

31Oct93 08:42:48 08:46:45 08:50 18 A-E 205
31Oct93 10:16:42 10:20:59 10:24 71 A-E 206
31Oct93 11:51:09 11:55:27 11:59 86 D-W 207
31Oct93 13:25:39 13:29:48 13:33 27 D-W 208

01Nov93 07:07:26 07:10:15 07:12 5 A-E 220
01Nov93 08:40:02 08:44:10 08:47 28 A-E 221
01Nov93 10:14:13 10:18:31 10:22 87 A-W 222
01Nov93 11:48:41 11:52:59 11:56 70 D-W 223
01Nov93 13:23:16 13:27:14 13:30 17 D-W 224

Atlanta, GA STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 08:45:42 08:49:00 08:51 8 A-E 173
29Oct93 10:18:50 10:23:06 10:26 71 A-E 174
29Oct93 11:53:36 11:57:43 12:01 25 A-W 175
29Oct93 13:28:28 13:32:35 13:36 23 D-E 176
29Oct93 15:02:57 15:07:15 15:11 86 D-W 177
29Oct93 16:37:50 16:41:27 16:44 10 D-W 178

30Oct93 08:43:08 08:46:58 08:50 15 A-E 189
30Oct93 10:16:58 10:21:14 10:25 60 A-W 190
30Oct93 11:51:53 11:55:58 11:59 21 D-W 191
30Oct93 13:26:38 13:30:49 13:34 28 D-E 192
30Oct93 15:01:06 15:05:22 15:09 47 D-W 193
30Oct93 16:36:34 16:39:25 16:41 5 D-W 194

31Oct93 08:40:34 08:44:41 08:48 27 A-E 205
31Oct93 10:14:54 10:19:07 10:22 37 A-W 206
31Oct93 11:49:51 11:53:56 11:57 21 D-E 207
31Oct93 13:24:28 13:28:43 13:32 40 D-E 208
31Oct93 14:59:01 15:03:08 15:06 24 D-W 209

01Nov93 07:05:05 07:08:06 07:10 6 A-E 220
01Nov93 08:37:54 08:42:09 08:45 54 A-E 221
01Nov93 10:12:34 10:16:44 10:20 27 A-W 222
01Nov93 11:47:29 11:51:35 11:55 22 D-E 223
01Nov93 13:22:00 13:26:17 13:30 68 D-E 224
*01Nov93 14:56:46 15:00:33 15:03 13 D-W 225

Miami, FL STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 08:44:21 08:48:34 08:52 50 A-E 173
29Oct93 10:19:25 10:23:11 10:26 13 A-W 174
29Oct93 11:55:43 11:58:25 12:00 4 A-W 175
29Oct93 13:30:56 13:33:52 13:36 5 D-E 176
29Oct93 15:04:55 15:08:58 15:12 19 D-E 177
29Oct93 16:39:18 16:43:25 16:47 24 D-W 178

30Oct93 07:09:16 07:12:31 07:15 7 A-E 188
30Oct93 08:42:26 08:46:41 08:50 59 A-W 189
30Oct93 10:18:03 10:21:30 10:24 9 A-W 190
30Oct93 11:54:17 11:56:51 11:58 3 D-W 191
30Oct93 13:28:58 13:32:15 13:35 7 D-E 192
30Oct93 15:02:55 15:07:09 15:10 36 D-E 193
30Oct93 16:37:46 16:41:27 16:44 11 D-W 194

31Oct93 07:06:19 07:10:13 07:13 16 A-E 204
31Oct93 08:40:25 08:44:33 08:48 26 A-W 205
31Oct93 10:16:27 10:19:34 10:22 6 A-W 206
31Oct93 11:52:23 11:55:00 11:57 4 D-E 207
31Oct93 13:26:39 13:30:17 13:33 10 D-E 208
31Oct93 15:00:42 15:04:59 15:08 88 D-W 209
31Oct93 16:36:20 16:39:09 16:41 5 D-W 210

01Nov93 07:03:27 07:07:39 07:11 34 A-E 220
01Nov93 08:38:16 08:42:11 08:45 15 A-W 221
01Nov93 10:14:33 10:17:21 10:19 4 A-W 222
01Nov93 11:49:59 11:52:49 11:55 4 D-E 223
01Nov93 13:24:01 13:27:58 13:31 16 D-E 224
*01Nov93 14:58:17 15:02:29 15:06 33 D-W 225

Compiled by Dan Schultz, N8FGV
Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group
Send comments to n8fgv@amsat.org
/EX
SB SAREX @ AMSAT $STS-58.028
STS-58 Central R/S Times 10/29

Below are the rise and set times for STS-58 for selected US cities over the next four days. This data was generated to help hams without orbit programs to participate in the SAREX activities. Please note that the times shown are UTC and NOT LOCAL TIME. This listing includes only those passes with an elevation greater than 5 degrees. For information regarding SAREX frequencies and operations procedures, check your local PBBS, or bulletins from W1AW, W5RRR, W6VIO or WA3NAN.

STS-58 will be visible from mid northern latitudes for the next several mornings. If a shuttle pass occurs less than one hour before your local sunrise time, but before the morning twilight is too bright, the shuttle will appear as a bright star moving across the sky. If a pass occurs exactly one hour before sunrise, the orbiter may enter daylight while overhead, appearing suddenly out of the darkness.

*Landing is scheduled for 15:22 UTC on orbit 225 at Edwards Air Force Base, California. Data for orbit numbers greater than 225 is provided in the event that the mission is extended.

Symbol key: rise = time that shuttle appears above horizon
tca = time of closest approach to observer
set = time that shuttle disappears below horizon
el = maximium elevation above horizon
geo = geometry: A = Ascending orbit, moving south to north
D = Descending orbit, moving north to south
E = passes east of observer
W = passes west of observer

Chicago, IL STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 10:19:53 10:23:25 10:26 10 A-E 174
29Oct93 11:53:17 11:57:26 12:01 30 A-E 175
29Oct93 13:27:28 13:31:42 13:35 39 D-W 176
29Oct93 15:01:55 15:05:52 15:09 17 D-W 177

30Oct93 10:17:32 10:21:23 10:24 15 A-E 190
30Oct93 11:51:18 11:55:30 11:59 37 A-E 191
30Oct93 13:25:34 13:29:46 13:33 33 D-W 192
30Oct93 15:00:10 15:03:52 15:07 12 D-W 193

31Oct93 10:15:03 10:19:05 10:22 21 A-E 206
31Oct93 11:49:03 11:53:17 11:57 41 D-E 207
31Oct93 13:23:24 13:27:32 13:31 26 D-W 208
31Oct93 14:58:14 15:01:31 15:04 7 D-W 209

01Nov93 08:39:08 08:42:32 08:45 8 A-E 221
01Nov93 10:12:22 10:16:31 10:20 28 A-E 222
01Nov93 11:46:31 11:50:46 11:54 40 D-W 223
01Nov93 13:20:57 13:24:58 13:28 19 D-W 224

Huntsville, AL STS-58 Element Set GSFC-38

date rise tca set el geo orbit

```
29Oct93 08:45:57 08:48:46 08:51 5 A-E 173
29Oct93 10:18:34 10:22:46 10:26 43 A-E 174
29Oct93 11:53:05 11:57:17 12:00 34 A-W 175
29Oct93 13:27:54 13:32:04 13:35 28 D-E 176
29Oct93 15:02:24 15:06:42 15:10 87 D-W 177
29Oct93 16:37:15 16:40:55 16:44 11 D-W 178

30Oct93 08:43:09 08:46:43 08:49 10 A-E 189
30Oct93 10:16:36 10:20:52 10:24 84 A-E 190
30Oct93 11:51:20 11:55:30 11:59 28 A-W 191
30Oct93 13:26:04 13:30:17 13:34 33 D-E 192
30Oct93 15:00:33 15:04:49 15:08 45 D-W 193
30Oct93 16:35:56 16:38:52 16:41 5 D-W 194

31Oct93 08:40:26 08:44:24 08:47 18 A-E 205
31Oct93 10:14:27 10:18:43 10:22 56 A-W 206
31Oct93 11:49:17 11:53:27 11:57 26 D-W 207
31Oct93 13:23:55 13:28:11 13:31 46 D-E 208
31Oct93 14:58:28 15:02:35 15:06 24 D-W 209

01Nov93 08:37:39 08:41:50 08:45 33 A-E 221
01Nov93 10:12:04 10:16:18 10:20 37 A-W 222
01Nov93 11:46:55 11:51:05 11:54 26 D-E 223
01Nov93 13:21:27 13:25:45 13:29 75 D-E 224
*01Nov93 14:56:11 15:00:00 15:03 14 D-W 225

Houston, TX STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 10:16:14 10:20:28 10:24 56 A-E 174
29Oct93 11:51:07 11:55:05 11:58 17 A-W 175
29Oct93 13:26:36 13:30:10 13:33 10 D-W 176
29Oct93 15:01:19 15:05:16 15:08 16 D-E 177
29Oct93 16:35:37 16:39:55 16:43 71 D-W 178
29Oct93 18:11:06 18:14:02 18:16 5 D-W 179

30Oct93 08:40:53 08:44:24 08:47 9 A-E 189
30Oct93 10:14:20 10:18:35 10:22 61 A-W 190
30Oct93 11:49:35 11:53:23 11:56 13 A-W 191
30Oct93 13:24:55 13:28:31 13:31 10 D-E 192
30Oct93 14:59:24 15:03:31 15:07 23 D-E 193
30Oct93 16:33:49 16:38:00 16:41 30 D-W 194

31Oct93 08:38:06 08:42:05 08:45 19 A-E 205
31Oct93 10:12:17 10:16:28 10:20 31 A-W 206
31Oct93 11:47:44 11:51:24 11:54 11 A-W 207
31Oct93 13:22:50 13:26:33 13:29 11 D-E 208
31Oct93 14:57:10 15:01:25 15:05 39 D-E 209
31Oct93 16:31:52 16:35:44 16:39 15 D-W 210

01Nov93 08:35:19 08:39:32 08:43 40 A-E 221
01Nov93 10:10:02 10:14:05 10:17 20 A-W 222
01Nov93 11:45:33 11:49:08 11:52 10 D-W 223
```

01Nov93 13:20:22 13:24:15 13:27 14 D-E 224
*01Nov93 14:54:40 14:58:57 15:02 82 D-E 225
*01Nov93 16:29:52 16:33:08 16:35 7 D-W 226

Denver, CO (Seattle has been moved to the west coast bulletin)
STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 11:50:00 11:54:00 11:57 20 A-E 175
29Oct93 13:23:58 13:28:15 13:32 66 A-E 176
29Oct93 14:58:23 15:02:40 15:06 62 D-W 177
29Oct93 16:32:55 16:36:55 16:40 18 D-W 178

30Oct93 10:14:58 10:18:04 10:20 6 A-E 190
30Oct93 11:47:53 11:52:02 11:55 30 A-E 191
30Oct93 13:22:05 13:26:22 13:30 75 D-W 192
30Oct93 14:56:31 15:00:46 15:04 46 D-W 193
30Oct93 16:31:13 16:34:55 16:38 12 D-W 194

31Oct93 10:12:04 10:15:43 10:18 11 A-E 206
31Oct93 11:45:34 11:49:48 11:53 44 A-E 207
31Oct93 13:19:54 13:24:12 13:27 76 D-W 208
31Oct93 14:54:22 14:58:33 15:02 31 D-W 209
31Oct93 16:29:22 16:32:34 16:35 7 D-W 210

01Nov93 10:09:09 10:13:06 10:16 17 A-E 222
01Nov93 11:43:01 11:47:18 11:51 60 A-E 223
01Nov93 13:17:26 13:21:43 13:25 67 D-W 224
*01Nov93 14:51:56 14:56:00 14:59 21 D-W 225

Compiled by Dan Schultz, N8FGV
Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group
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/EX
SB SAREX @ AMSAT $STS-58.029
STS-58 Western R/S Times 10/29

Below are the rise and set times for STS-58 for selected US cities
over the next four days. This data was generated to help hams without
orbit programs to participate in the SAREX activities. Please note that
the times shown are UTC and NOT LOCAL TIME. This listing includes only
those passes with an elevation greater than 5 degrees. For information
regarding SAREX frequencies and operations procedures, check your
local PBBS, or bulletins from W1AW, W5RRR, W6VIO or WA3NAN.

STS-58 will be visible from mid northern latitudes for the next several
mornings. If a shuttle pass occurs less than one hour before your local
sunrise time, but before the morning twilight is too bright, the shuttle
will appear as a bright star moving across the sky. If a pass occurs
exactly one hour before sunrise, the orbiter may enter daylight while
overhead, appearing suddenly out of the darkness.

*Landing is scheduled for 15:22 UTC on orbit 225 at Edwards Air Force Base, California. Data for orbit numbers greater than 225 is provided in the event that the mission is extended.

Symbol key: rise = time that shuttle appears above horizon
tca = time of closest approach to observer
set = time that shuttle disappears below horizon
el = maximium elevation above horizon
geo = geometry: A = Ascending orbit, moving south to north
D = Descending orbit, moving north to south
E = passes east of observer
W = passes west of observer

Seattle, WA (Denver has been moved to the central US bulletin)
STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 13:22:25 13:25:33 13:28 6 A-E 176
29Oct93 14:55:39 14:59:19 15:02 11 D-E 177
29Oct93 16:29:41 16:33:10 16:36 9 D-W 178

30Oct93 13:20:06 13:23:27 13:26 8 A-E 192
30Oct93 14:53:36 14:57:17 15:00 12 D-W 193
30Oct93 16:27:52 16:31:05 16:33 7 D-W 194

31Oct93 13:17:32 13:21:05 13:24 10 A-E 208
31Oct93 14:51:17 14:54:56 14:58 11 D-W 209
31Oct93 16:25:51 16:28:41 16:31 5 D-W 210

01Nov93 11:41:47 11:44:41 11:47 5 A-E 223
01Nov93 13:14:47 13:18:26 13:21 11 D-E 224
*01Nov93 14:48:45 14:52:17 14:55 10 D-W 225

Albuquerque, NM STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 10:16:02 10:19:09 10:21 6 A-E 174
29Oct93 11:48:58 11:53:12 11:56 52 A-E 175
29Oct93 13:23:32 13:27:45 13:31 33 A-W 176
29Oct93 14:58:18 15:02:30 15:06 32 D-E 177
29Oct93 16:32:47 16:37:04 16:40 60 D-W 178
29Oct93 18:07:51 18:11:12 18:14 8 D-W 179

30Oct93 10:13:23 10:17:07 10:20 12 A-E 190
30Oct93 11:47:03 11:51:19 11:55 84 A-W 191
30Oct93 13:21:47 13:25:58 13:29 29 D-W 192
30Oct93 14:56:27 15:00:43 15:04 41 D-E 193
30Oct93 16:30:58 16:35:09 16:38 31 D-W 194

31Oct93 10:10:46 10:14:49 10:18 22 A-E 206
31Oct93 11:44:55 11:49:10 11:52 51 A-W 207
31Oct93 13:19:43 13:23:54 13:27 28 D-E 208
31Oct93 14:54:17 14:58:35 15:02 63 D-E 209

31Oct93 16:28:56 16:32:54 16:36 17 D-W 210

01Nov93 08:35:27 08:38:16 08:40 5 A-E 221
01Nov93 10:08:03 10:12:16 10:15 40 A-E 222
01Nov93 11:42:32 11:46:46 11:50 37 A-W 223
01Nov93 13:17:19 13:21:31 13:25 30 D-E 224
*01Nov93 14:51:49 14:56:07 14:59 76 D-W 225
*01Nov93 16:26:45 16:30:18 16:33 10 D-W 226

Los Angeles, CA STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 11:46:50 11:50:52 11:54 22 A-E 175
29Oct93 13:20:59 13:25:13 13:28 45 A-W 176
29Oct93 14:55:54 15:00:00 15:03 22 D-W 177
29Oct93 16:30:31 16:34:47 16:38 40 D-E 178
29Oct93 18:05:03 18:09:12 18:12 26 D-W 179

30Oct93 11:44:42 11:48:55 11:52 42 A-E 191
30Oct93 13:19:14 13:23:26 13:27 31 A-W 192
30Oct93 14:54:08 14:58:15 15:01 23 D-E 193
30Oct93 16:28:39 16:32:57 16:36 67 D-E 194
30Oct93 18:03:23 18:07:13 18:10 14 D-W 195

31Oct93 10:09:03 10:12:34 10:15 9 A-E 206
31Oct93 11:42:26 11:46:42 11:50 84 A-E 207
31Oct93 13:17:13 13:21:21 13:25 25 A-W 208
31Oct93 14:52:01 14:56:11 14:59 27 D-E 209
31Oct93 16:26:29 16:30:47 16:34 65 D-W 210
31Oct93 18:01:37 18:04:54 18:07 7 D-W 211

01Nov93 10:06:00 10:09:57 10:13 17 A-E 222
01Nov93 11:39:59 11:44:15 11:48 54 A-W 223
01Nov93 13:14:53 13:19:00 13:22 23 D-W 224
*01Nov93 14:49:34 14:53:48 14:57 35 D-E 225
*01Nov93 16:24:04 16:28:16 16:31 32 D-W 226

Honolulu, HI STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 13:11:26 13:15:36 13:19 36 A-E 176
29Oct93 14:46:29 14:50:09 14:53 11 A-W 177
29Oct93 19:34:06 19:36:50 19:39 4 D-E 180
29Oct93 21:07:32 21:11:45 21:15 33 D-E 181
29Oct93 22:42:28 22:46:03 22:49 10 D-W 182

30Oct93 13:09:26 13:13:42 13:17 73 A-W 192
30Oct93 14:45:18 14:48:28 14:51 6 A-W 193
30Oct93 19:31:48 19:35:12 19:38 7 D-E 196
30Oct93 21:05:35 21:09:53 21:13 87 D-W 197

31Oct93 11:33:35 11:37:15 11:40 11 A-E 207
31Oct93 13:07:24 13:11:33 13:15 27 A-W 208
31Oct93 19:29:18 19:33:10 19:36 13 D-E 212
31Oct93 21:03:30 21:07:40 21:11 30 D-W 213

01Nov93 11:30:33 11:34:41 11:38 25 A-E 223
01Nov93 13:05:18 13:09:09 13:12 14 A-W 224
*01Nov93 19:26:39 19:30:46 19:34 24 D-E 228
*01Nov93 21:01:20 21:05:07 21:08 13 D-W 229

Compiled by Dan Schultz, N8FGV
Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group
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/EX
SB SAREX @ AMSAT $STS-58.030
STS-58 World R/S Times 10/29

Below are the rise and set times for STS-58 for selected worldwide cities over the next four days. This data was generated to help hams without orbit programs to participate in the SAREX activities. Please note that the times shown are UTC and NOT LOCAL TIME. This listing includes only those passes with an elevation greater than 5 degrees. For information regarding SAREX frequencies and operations procedures, check your local PBBS, or bulletins from W1AW, W5RRR, W6VIO or WA3NAN.

STS-58 will be visible from mid northern latitudes for the next several mornings. If a shuttle pass occurs less than one hour before your local sunrise time, but before the morning twilight is too bright, the shuttle will appear as a bright star moving across the sky. If a pass occurs exactly one hour before sunrise, the orbiter may enter daylight while overhead, appearing suddenly out of the darkness.

*Landing is scheduled for 15:22 UTC on orbit 225 at Edwards Air Force Base, California. Data for orbit numbers greater than 225 is provided in the event that the mission is extended.

Symbol key: rise = time that shuttle appears above horizon
tca = time of closest approach to observer
set = time that shuttle disappears below horizon
el = maximium elevation above horizon
geo = geometry: A = Ascending orbit, moving south to north
D = Descending orbit, moving north to south
E = passes east of observer
W = passes west of observer

London, England STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 07:28:45 07:31:37 07:33 5 D-W 172

30Oct93 05:53:10 05:55:55 05:58 4 A-E 187
30Oct93 07:26:43 07:29:29 07:31 4 D-W 188

31Oct93 05:50:39 05:53:29 05:55 5 D-E 203
31Oct93 07:24:30 07:27:03 07:29 4 D-W 204

01Nov93 05:47:53 05:50:45 05:53 5 D-W 219

Paris, France STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 05:55:32 05:58:24 06:00 5 A-E 171
29Oct93 07:28:56 07:32:02 07:34 6 D-W 172

30Oct93 05:53:17 05:56:17 05:58 6 A-E 187
30Oct93 07:26:56 07:29:56 07:32 5 D-W 188

31Oct93 05:50:46 05:53:53 05:56 6 D-E 203
31Oct93 07:24:45 07:27:30 07:29 4 D-W 204

01Nov93 04:14:52 04:17:33 04:19 4 A-E 218
01Nov93 05:48:03 05:51:10 05:53 6 D-W 219

Tokyo, Japan STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 00:03:34 00:07:53 00:11 87 D-W 167
29Oct93 01:38:21 01:42:06 01:45 12 D-W 168
29Oct93 17:45:19 17:48:26 17:51 6 A-E 179
29Oct93 19:18:14 19:22:28 19:26 48 A-E 180
29Oct93 20:52:45 20:56:59 21:00 38 A-W 181
29Oct93 22:27:28 22:31:42 22:35 38 D-E 182

30Oct93 00:01:44 00:06:00 00:09 48 D-W 183
30Oct93 01:36:55 01:40:04 01:42 6 D-W 184
30Oct93 17:42:41 17:46:23 17:49 12 A-E 195
30Oct93 19:16:18 19:20:35 19:24 87 A-W 196
30Oct93 20:50:59 20:55:12 20:58 33 D-W 197
30Oct93 22:25:37 22:29:54 22:33 50 D-E 198

31Oct93 17:40:03 17:44:05 17:47 21 A-E 211
31Oct93 19:14:09 19:18:26 19:22 57 A-W 212
31Oct93 20:48:54 20:53:07 20:56 32 D-E 213
31Oct93 22:23:27 22:27:45 22:31 78 D-E 214
31Oct93 23:58:09 00:02:01 00:05 15 D-W 215

*01Nov93 17:37:19 17:41:32 17:45 38 A-E 227
*01Nov93 19:11:45 19:16:00 19:19 41 A-W 228
*01Nov93 20:46:29 20:50:43 20:54 35 D-E 229
*01Nov93 22:21:00 22:25:17 22:29 61 D-W 230
*01Nov93 23:56:01 23:59:24 00:02 8 D-W 231

Sydney, Australia STS-58 Element Set GSFC-38

date rise tca set el geo orbit

29Oct93 05:00:55 05:04:10 05:06 6 D-E 170
29Oct93 06:33:50 06:38:15 06:42 57 D-E 171
29Oct93 08:08:31 08:12:51 08:16 29 D-W 172
29Oct93 09:43:25 09:47:43 09:51 24 A-E 173
29Oct93 11:17:58 11:22:25 11:26 79 A-E 174
29Oct93 12:52:50 12:56:39 12:59 12 A-W 175

30Oct93 04:58:15 05:02:08 05:05 13 D-E 186
30Oct93 06:31:56 06:36:23 06:40 75 D-W 187
30Oct93 08:06:48 08:11:05 08:14 24 D-W 188
30Oct93 09:41:36 09:45:57 09:49 29 A-E 189
30Oct93 11:16:06 11:20:32 11:24 54 A-W 190
30Oct93 12:51:28 12:54:37 12:57 6 A-W 191

31Oct93 04:55:38 04:59:50 05:03 23 D-E 202
31Oct93 06:29:49 06:34:14 06:38 45 D-W 203
31Oct93 08:04:46 08:09:02 08:12 23 A-W 204
31Oct93 09:39:26 09:43:52 09:47 39 A-E 205
31Oct93 11:14:00 11:18:18 11:22 28 A-W 206

01Nov93 04:52:55 04:57:17 05:01 43 D-E 218
01Nov93 06:27:28 06:31:50 06:35 32 D-W 219
01Nov93 08:02:24 08:06:41 08:10 24 A-E 220
01Nov93 09:36:57 09:41:26 09:45 63 A-E 221
01Nov93 11:11:42 11:15:43 11:19 15 A-W 222

Compiled by Dan Schultz, N8FGV
Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group
Send comments to n8fgv@amsat.org
/EX

297. ORBS$301.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 13:27:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-301.o@ampr.org>
Source record: 28507
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-301.O
Orbital Elements 301.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX October 28, 1993
BID: $ORBS-301.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93299.24383121
Element set: 206
Inclination: 27.1666 deg
RA of node: 359.3410 deg
Eccentricity: 0.6019738
Arg of perigee: 124.9488 deg
Mean anomaly: 306.7842 deg
Mean motion: 2.05883620 rev/day
Decay rate: -7.2e-07 rev/day^2
Epoch rev: 7796
Checksum: 319

Satellite: UO-11
Catalog number: 14781
Epoch time: 93299.07482308
Element set: 607
Inclination: 97.8024 deg
RA of node: 319.6332 deg
Eccentricity: 0.0011402
Arg of perigee: 304.7018 deg
Mean anomaly: 55.3113 deg
Mean motion: 14.69072104 rev/day
Decay rate: 2.23e-06 rev/day^2
Epoch rev: 51593
Checksum: 280

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93299.10285174
Element set: 807
Inclination: 82.9272 deg
RA of node: 141.8725 deg
Eccentricity: 0.0011615
Arg of perigee: 322.1644 deg
```

Mean anomaly: 37.8691 deg
Mean motion: 13.72324920 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 31779
Checksum: 308

Satellite: AO-13
Catalog number: 19216
Epoch time: 93291.97902075
Element set: 803
Inclination: 57.9233 deg
RA of node: 288.8083 deg
Eccentricity: 0.7215023
Arg of perigee: 326.4503 deg
Mean anomaly: 3.7960 deg
Mean motion: 2.09724992 rev/day
Decay rate: -1.12e-06 rev/day^2
Epoch rev: 4095
Checksum: 308

Satellite: FO-20
Catalog number: 20480
Epoch time: 93299.00186596
Element set: 604
Inclination: 99.0180 deg
RA of node: 130.3366 deg
Eccentricity: 0.0541032
Arg of perigee: 150.1410 deg
Mean anomaly: 213.1750 deg
Mean motion: 12.83221199 rev/day
Decay rate: -4.8e-07 rev/day^2
Epoch rev: 17409
Checksum: 271

Satellite: AO-21
Catalog number: 21087
Epoch time: 93298.13050588
Element set: 362
Inclination: 82.9443 deg
RA of node: 316.6683 deg
Eccentricity: 0.0036745
~Arg of perigee: 20.9355 deg
Mean anomaly: 339.3296 deg
Mean motion: 13.74527377 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 13729
Checksum: 332

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93298.75967888

Element set: 607
Inclination: 82.9248 deg
RA of node: 185.2906 deg
Eccentricity: 0.0030933
Arg of perigee: 41.5515 deg
Mean anomaly: 318.7983 deg
Mean motion: 13.74028575 rev/day
Decay rate: 4.8e-07 rev/day^2
Epoch rev: 13645
Checksum: 355

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93298.03432981
Element set: 204
Inclination: 1.3841 deg
RA of node: 114.8650 deg
Eccentricity: 0.2933270
Arg of perigee: 159.2220 deg
Mean anomaly: 217.6982 deg
Mean motion: 1.42202580 rev/day
Decay rate: -4.7e-07 rev/day^2
Epoch rev: 241
Checksum: 263

/EX

298. ORBS$301.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 13:30:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-301.d@ampr.org>
Source record: 28508
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-301.D
Orbital Elements 301.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX October 28, 1993
BID: $ORBS-301.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93298.72689339
Element set: 907
Inclination: 98.6070 deg
RA of node: 21.5185 deg
Eccentricity: 0.0011128
Arg of perigee: 155.8328 deg
Mean anomaly: 204.3377 deg
Mean motion: 14.29799008 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 19608
Checksum: 335

Satellite: AO-16
Catalog number: 20439
Epoch time: 93298.72161595
Element set: 707
Inclination: 98.6156 deg
RA of node: 22.5143 deg
Eccentricity: 0.0011307
Arg of perigee: 156.6454 deg
Mean anomaly: 203.5244 deg
Mean motion: 14.29856581 rev/day
Decay rate: 8.6e-07 rev/day^2
Epoch rev: 19609
Checksum: 320

Satellite: DO-17
Catalog number: 20440
Epoch time: 93298.76860351
Element set: 707
Inclination: 98.6159 deg
RA of node: 22.8081 deg
Eccentricity: 0.0011473
Arg of perigee: 155.9730 deg
```

Mean anomaly: 204.1990 deg
Mean motion: 14.29993472 rev/day
Decay rate: 8.8e-07 rev/day^2
Epoch rev: 19611
Checksum: 324

Satellite: WO-18
Catalog number: 20441
Epoch time: 93298.73999612
Element set: 708
Inclination: 98.6156 deg
RA of node: 22.7974 deg
Eccentricity: 0.0011996
Arg of perigee: 156.7230 deg
Mean anomaly: 203.4497 deg
Mean motion: 14.29971655 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 19611
Checksum: 343

Satellite: LO-19
Catalog number: 20442
Epoch time: 93298.73359862
Element set: 707
Inclination: 98.6163 deg
RA of node: 22.9939 deg
Eccentricity: 0.0012327
Arg of perigee: 156.2467 deg
Mean anomaly: 203.9286 deg
Mean motion: 14.30063548 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 19612
Checksum: 329

Satellite: UO-22
Catalog number: 21575
Epoch time: 93298.74500372
Element set: 407
Inclination: 98.4612 deg
RA of node: 12.6843 deg
Eccentricity: 0.0007035
Arg of perigee: 274.2635 deg
Mean anomaly: 85.7748 deg
Mean motion: 14.36859247 rev/day
Decay rate: 1.03e-06 rev/day^2
Epoch rev: 11941
Checksum: 310

Satellite: KO-23
Catalog number: 22077
Epoch time: 93298.74240246

Element set: 304
Inclination: 66.0822 deg
RA of node: 50.8442 deg
Eccentricity: 0.0003465
Arg of perigee: 348.4485 deg
Mean anomaly: 11.6453 deg
Mean motion: 12.86281536 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5663
Checksum: 276

Satellite: AO-27
Catalog number: 22825
Epoch time: 93295.64096742
Element set: 205
Inclination: 98.6795 deg
RA of node: 8.5384 deg
Eccentricity: 0.0007562
Arg of perigee: 177.6052 deg
Mean anomaly: 182.5167 deg
Mean motion: 14.27585294 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 379
Checksum: 339

Satellite: IO-26
Catalog number: 22826
Epoch time: 93295.63906879
Element set: 206
Inclination: 98.6792 deg
RA of node: 8.5415 deg
Eccentricity: 0.0008651
Arg of perigee: 179.1527 deg
Mean anomaly: 180.9670 deg
Mean motion: 14.27687862 rev/day
Decay rate: 7.8e-07 rev/day^2
Epoch rev: 379
Checksum: 355

Satellite: KO-25
Catalog number: 22830
Epoch time: 93298.71610244
Element set: 207
Inclination: 98.5809 deg
RA of node: 11.3340 deg
Eccentricity: 0.0011835
Arg of perigee: 139.9688 deg
Mean anomaly: 220.2367 deg
Mean motion: 14.28011695 rev/day
Decay rate: 1.24e-06 rev/day^2
Epoch rev: 423

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Checksum: 285

/EX
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299. ORBS$301.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 13:40:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-301.w@ampr.org>
Source record: 28509
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-301.W
Orbital Elements 301.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX October 28, 1993
BID: $ORBS-301.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93300.72651427
Element set: 608
Inclination: 99.0865 deg
RA of node: 343.0970 deg
Eccentricity: 0.0014906
Arg of perigee: 151.8994 deg
Mean anomaly: 208.2999 deg
Mean motion: 14.13555759 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 45749
Checksum: 353

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93294.47268088
Element set: 506
Inclination: 98.5156 deg
RA of node: 305.7322 deg
Eccentricity: 0.0012934
Arg of perigee: 311.4298 deg
Mean anomaly: 48.5778 deg
Mean motion: 14.24837765 rev/day
Decay rate: 8.2e-07 rev/day^2
Epoch rev: 36861
Checksum: 347

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93298.90570410
Element set: 206
Inclination: 82.5396 deg
RA of node: 94.9503 deg
Eccentricity: 0.0017341
Arg of perigee: 115.3342 deg
```

Mean anomaly: 244.9614 deg
Mean motion: 13.84695739 rev/day
Decay rate: 3.9e-07 rev/day^2
Epoch rev: 28993
Checksum: 331

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93298.94058135
Element set: 206
Inclination: 82.5415 deg
RA of node: 129.4526 deg
Eccentricity: 0.0017465
Arg of perigee: 125.4990 deg
Mean anomaly: 234.7765 deg
Mean motion: 13.16961909 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25242
Checksum: 320

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93298.39832634
Element set: 406
Inclination: 99.1495 deg
RA of node: 276.8780 deg
Eccentricity: 0.0012791
Arg of perigee: 73.7107 deg
Mean anomaly: 286.5606 deg
Mean motion: 14.12924957 rev/day
Decay rate: -2.93e-06 rev/day^2
Epoch rev: 26206
Checksum: 338

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93299.11903329
Element set: 207
Inclination: 82.5239 deg
RA of node: 330.5443 deg
Eccentricity: 0.0014109
Arg of perigee: 157.6371 deg
Mean anomaly: 202.5407 deg
Mean motion: 13.84347402 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 23530
Checksum: 287

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93298.42537212

Element set: 908
Inclination: 82.5459 deg
RA of node: 72.9825 deg
Eccentricity: 0.0016410
Arg of perigee: 148.0687 deg
Mean anomaly: 212.1432 deg
Mean motion: 13.16023362 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19223
Checksum: 279

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93298.73841042
Element set: 707
Inclination: 82.5470 deg
RA of node: 34.6912 deg
Eccentricity: 0.0017240
Arg of perigee: 82.9970 deg
Mean anomaly: 277.3151 deg
Mean motion: 13.84178650 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 16818
Checksum: 311

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93298.92381594
Element set: 812
Inclination: 98.8525 deg
RA of node: 321.3744 deg
Eccentricity: 0.0014692
Arg of perigee: 308.8653 deg
Mean anomaly: 51.1202 deg
Mean motion: 14.01317616 rev/day
Decay rate: 3.60e-06 rev/day^2
Epoch rev: 16089
Checksum: 311

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93299.07374770
Element set: 706
Inclination: 82.5275 deg
RA of node: 332.2559 deg
Eccentricity: 0.0013857
Arg of perigee: 349.6098 deg
Mean anomaly: 10.4773 deg
Mean motion: 13.83562027 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 15538

Checksum: 325

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93297.56590798
Element set: 608
Inclination: 82.5424 deg
RA of node: 336.1765 deg
Eccentricity: 0.0014196
Arg of perigee: 55.6002 deg
Mean anomaly: 304.6456 deg
Mean motion: 13.16456765 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12035
Checksum: 306

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93295.63898410
Element set: 813
Inclination: 98.6472 deg
RA of node: 323.3661 deg
Eccentricity: 0.0012171
Arg of perigee: 203.1133 deg
Mean anomaly: 156.9505 deg
Mean motion: 14.22322766 rev/day
Decay rate: 1.64e-06 rev/day^2
Epoch rev: 12676
Checksum: 290

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93298.88640364
Element set: 607
Inclination: 82.5509 deg
RA of node: 282.2055 deg
Eccentricity: 0.0014735
Arg of perigee: 62.6900 deg
Mean anomaly: 297.5720 deg
Mean motion: 13.16824970 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10562
Checksum: 311

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93300.19232430
Element set: 206
Inclination: 82.5497 deg
RA of node: 31.0715 deg
Eccentricity: 0.0022297

```
Arg of perigee: 155.2055 deg
Mean anomaly: 205.0182 deg
Mean motion: 13.82988487 rev/day
Decay rate: 8.7e-07 rev/day^2
Epoch rev: 788
Checksum: 295

/EX
```

300. ORBS$301.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 13:44:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-301.m@ampr.org>
Source record: 28510
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-301.M
Orbital Elements 301.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX October 28, 1993
BID: $ORBS-301.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93301.31899445
Element set: 540
Inclination: 51.6186 deg
RA of node: 270.6474 deg
Eccentricity: 0.0006514
Arg of perigee: 2.6256 deg
Mean anomaly: 358.3233 deg
Mean motion: 15.58550055 rev/day
Decay rate: 1.2439e-04 rev/day^2
Epoch rev: 43984
Checksum: 304

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93301.20177863
Element set: 356
Inclination: 28.4698 deg
RA of node: 286.9209 deg
Eccentricity: 0.0004452
Arg of perigee: 5.5939 deg
Mean anomaly: 354.4702 deg
Mean motion: 14.92891768 rev/day
Decay rate: 9.96e-06 rev/day^2
Epoch rev: 19140
Checksum: 326

Satellite: GRO
Catalog number: 21225
Epoch time: 93297.55475959
Element set: 211
Inclination: 28.4612 deg
RA of node: 73.5299 deg
Eccentricity: 0.0077420
Arg of perigee: 174.2221 deg
```

Mean anomaly: 185.9288 deg
Mean motion: 15.57904631 rev/day
Decay rate: 1.8229e-04 rev/day^2
Epoch rev: 2050
Checksum: 310

Satellite: UARS
Catalog number: 21701
Epoch time: 93301.16109823
Element set: 406
Inclination: 56.9877 deg
RA of node: 8.7080 deg
Eccentricity: 0.0005863
Arg of perigee: 89.4282 deg
Mean anomaly: 270.7416 deg
Mean motion: 14.96281379 rev/day
Decay rate: 8.66e-06 rev/day^2
Epoch rev: 11620
Checksum: 303

Satellite: POSAT
Catalog number: 22829
Epoch time: 93289.11726978
Element set: 204
Inclination: 98.6763 deg
RA of node: 2.0610 deg
Eccentricity: 0.0010043
Arg of perigee: 184.4594 deg
Mean anomaly: 175.6498 deg
Mean motion: 14.27975951 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 286
Checksum: 317

/EX

301. ORBS$301.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 13:52:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-301.n@ampr.org>
Source record: 28561
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-301.N
2Line Orbital Elements 301.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX October 28, 1993
BID: $ORBS-301.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93299.24383121 -.00000072 00000-0 10000-3 0 2062
2 14129 27.1666 359.3410 6019738 124.9488 306.7842 2.05883620 77965
UO-11
1 14781U 84021B 93299.07482308 .00000223 00000-0 41935-4 0 6079
2 14781 97.8024 319.6332 0011402 304.7018 55.3113 14.69072104515936
RS-10/11
1 18129U 87054A 93299.10285174 .00000046 00000-0 44148-4 0 8078
2 18129 82.9272 141.8725 0011615 322.1644 37.8691 13.72324920317791
AO-13
1 19216U 88 51 B 93291.97902075 -.00000112 00000-0 30938-2 0 8038
2 19216 57.9233 288.8083 7215023 326.4503 3.7960 2.09724992 40957
FO-20
1 20480U 90013C 93299.00186596 -.00000048 00000-0 -80958-4 0 6045
2 20480 99.0180 130.3366 0541032 150.1410 213.1750 12.83221199174090
AO-21
1 21087U 91006A 93298.13050588 .00000085 00000-0 82657-4 0 3624
2 21087 82.9443 316.6683 0036745 20.9355 339.3296 13.74527377137295
RS-12/13
1 21089U 91007A 93298.75967888 .00000048 00000-0 44678-4 0 6077
2 21089 82.9248 185.2906 0030933 41.5515 318.7983 13.74028575136455
ARSENE
1 22654U 93031B 93298.03432981 -.00000047 00000-0 10000-3 0 2041
2 22654 1.3841 114.8650 2933270 159.2220 217.6982 1.42202580 2416
UO-14
1 20437U 90005B 93298.72689339 .00000085 00000-0 40898-4 0 9073
2 20437 98.6070 21.5185 0011128 155.8328 204.3377 14.29799008196084
AO-16
1 20439U 90005D 93298.72161595 .00000086 00000-0 41254-4 0 7070
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2 20439 98.6156 22.5143 0011307 156.6454 203.5244 14.29856581196099
DO-17
1 20440U 90005E 93298.76860351 .00000088 00000-0 41931-4 0 7076
2 20440 98.6159 22.8081 0011473 155.9730 204.1990 14.29993472196110
WO-18
1 20441U 90005F 93298.73999612 .00000071 00000-0 35353-4 0 7081
2 20441 98.6156 22.7974 0011996 156.7230 203.4497 14.29971655196115
LO-19
1 20442U 90005G 93298.73359862 .00000084 00000-0 40309-4 0 7079
2 20442 98.6163 22.9939 0012327 156.2467 203.9286 14.30063548196120
UO-22
1 21575U 91050B 93298.74500372 .00000103 00000-0 41671-4 0 4075
2 21575 98.4612 12.6843 0007035 274.2635 85.7748 14.36859247119414
KO-23
1 22077U 92052B 93298.74240246 .00000000 00000-0 10000-3 0 3040
2 22077 66.0822 50.8442 0003465 348.4485 11.6453 12.86281536 56633
AO-27
1 22825U 93061C 93295.64096742 .00000056 00000-0 30796-4 0 2054
2 22825 98.6795 8.5384 0007562 177.6052 182.5167 14.27585294 3797
IO-26
1 22826U 93061D 93295.63906879 .00000078 00000-0 39566-4 0 2064
2 22826 98.6792 8.5415 0008651 179.1527 180.9670 14.27687862 3799
KO-25
1 22830U 93061H 93298.71610244 .00000124 00000-0 57835-4 0 2071
2 22830 98.5809 11.3340 0011835 139.9688 220.2367 14.28011695 4238
NOAA-9
1 15427U 84123A 93300.72651427 .00000099 00000-0 62608-4 0 6087
2 15427 99.0865 343.0970 0014906 151.8994 208.2999 14.13555759457494
NOAA-10
1 16969U 86073A 93294.47268088 .00000082 00000-0 43407-4 0 5061
2 16969 98.5156 305.7322 0012934 311.4298 48.5778 14.24837765368616
MET-2/17
1 18820U 88005A 93298.90570410 .00000039 00000-0 29460-4 0 2065
2 18820 82.5396 94.9503 0017341 115.3342 244.9614 13.84695739289935
MET-3/2
1 19336U 88064A 93298.94058135 .00000043 00000-0 10000-3 0 2066
2 19336 82.5415 129.4526 0017465 125.4990 234.7765 13.16961909252425
NOAA-11
1 19531U 88 89 A 93298.39832634 -.00000293 00000-0 -14675-3 0 4066
2 19531 99.1495 276.8780 0012791 73.7107 286.5606 14.12924957262064
MET-2/18
1 19851U 89018A 93299.11903329 .00000043 00000-0 33498-4 0 2070
2 19851 82.5239 330.5443 0014109 157.6371 202.5407 13.84347402235301
MET-3/3
1 20305U 89086A 93298.42537212 .00000043 00000-0 10000-3 0 9089
2 20305 82.5459 72.9825 0016410 148.0687 212.1432 13.16023362192233
MET-2/19
1 20670U 90057A 93298.73841042 .00000015 00000-0 79036-5 0 7079
2 20670 82.5470 34.6912 0017240 82.9970 277.3151 13.84178650168180
FY-1/2
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1 20788U 90081A 93298.92381594 .00000360 00000-0 26172-3 0 8129
2 20788 98.8525 321.3744 0014692 308.8653 51.1202 14.01317616160898
MET-2/20
1 20826U 90086A 93299.07374770 .00000046 00000-0 36682-4 0 7063
2 20826 82.5275 332.2559 0013857 349.6098 10.4773 13.83562027155382
MET-3/4
1 21232U 91030A 93297.56590798 .00000043 00000-0 10000-3 0 6080
2 21232 82.5424 336.1765 0014196 55.6002 304.6456 13.16456765120350
NOAA-12
1 21263U 91032A 93295.63898410 .00000164 00000-0 82106-4 0 8133
2 21263 98.6472 323.3661 0012171 203.1133 156.9505 14.22322766126769
MET-3/5
1 21655U 91056A 93298.88640364 .00000043 00000-0 10000-3 0 6077
2 21655 82.5509 282.2055 0014735 62.6900 297.5720 13.16824970105624
MET-2/21
1 22782U 93055A 93300.19232430 .00000087 00000-0 73922-4 0 2065
2 22782 82.5497 31.0715 0022297 155.2055 205.0182 13.82988487 7889
MIR
1 16609U 86017A 93301.31899445 .00012439 00000-0 16561-3 0 5406
2 16609 51.6186 270.6474 0006514 2.6256 358.3233 15.58550055439842
HUBBLE
1 20580U 90037B 93301.20177863 .00000996 00000-0 86690-4 0 3568
2 20580 28.4698 286.9209 0004452 5.5939 354.4702 14.92891768191401
GRO
1 21225U 91027B 93297.55475959 .00018229 00000-0 19892-3 0 2111
2 21225 28.4612 73.5299 0077420 174.2221 185.9288 15.57904631 20500
UARS
1 21701U 91063B 93301.16109823 .00000866 00000-0 86542-4 0 4068
2 21701 56.9877 8.7080 0005863 89.4282 270.7416 14.96281379116200
POSAT
1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
/EX
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302. * SpaceNews 01-Nov-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-10-29 16:33:12 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1101@ampr.org>
Source record: 28562
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1101
* SpaceNews 01-Nov-93 *

BID: $SPC1101

=========
SpaceNews
=========

MONDAY NOVEMBER 1, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is
published every week and is made available for unlimited distribution.

* STS-58 SAREX NEWS *
====================
The latest in a series of Shuttle Amateur Radio Experiments carried onboard
Space Shuttle "Columbia" has been a great success. The Shuttle astronauts
managed to make scheduled radio contacts with school groups as well as
general contacts with amateur radio operators around the world.

The following packet beacon was sent by Space Shuttle "Columbia" on
25-Oct-93 at 15:14:03 UTC and received by N2NRD:

Thanks for all the great QSO's. KC5AXA, KC5CKM, and I love them.
We're half way through the mission, beginning flight day 8 today.
We are doing human metabolic and cardiovascular experiments in the lab today.
We will also continue with an experiment to quantify the impact human
activity in a space ship on the microgravity environment.
We have had spectacular views of our beautiful home planet.
We hope to bring back a large quantity of pictures.
73
KC5ACR

* MIR OPERATING HINTS *
======================
This week: Digipeating through MIR

As some have discovered, it is possible to digipeat though the MIR packet
station and use it to connect to other packet stations hundreds of miles
away. Unfortunately, the data throughput is pitifully small. WF1F in
Billerica, Massachusettes ran a test with Joe WA2GSY in New Jersey. Both
stations ran 20 foot 2-meter Yagis with an ERP of approximately 1200 watts.
Late one weekday evening, both stations were fortunate enough to find the
MIR PBBS with no users on frequency. This is an extremely rare condition.
Both stations attempted to directly connect to each other using MIR as a

digipeater, and were successful. Every line of text that was sent to each other made it through without error. However, because of retries, acknowledgments, and other packet related overhead, the 120 character per second transmissions were reduced to approximately 1 character for every 2.5 seconds.

The following short message took 4 minutes and 37 seconds to transfer through Mir, and required over 132 packet transmissions. There were probably many more transmissions, but the equipment was not set up to count any packet collisions at either end.

```
CONNECTED to WA2GSY VIA R2MIR [04/18/93 00:25:00]
WA2GSY>:PLEASE CONNECT TO WA2GSY-1 FOR MY PMS
WA2GSY>:Hi miles
WF1F>:HI JOE GOT YOU
WA2GSY>:How are you
WA2GSY>:Glad to see you on
WA2GSY>:Whats up
WA2GSY>:Sure is happy to hear you
WF1F>LETS TRY OSCAR 13 OR SSB
WA2GSY>:Did you get the equip fixed
WA2GSY>:*** DISCONNECTED [04/18/93 00:29:37]
```

Now for the statistics:

```
Packets from WF1F to WA2GSY through MIR: 31
Packets from WA2GSY to WF1F through MIR: 35

Total time 4:37
Total characters sent by WF1F: 39
Total characters sent by WA2GSY: 110
```

Throughput would further be reduced if there were ground stations trying to connect to the PBBS on MIR while other stations used MIR for digipeating purposes. The bottom line is that digipeating through MIR is NOT recommended while others are actively connected to the MIR PBBS. Even under ideal conditions with high ERP, it is not possible to get much data though MIR acting as a digipeater.

Remember, only 1 station can connect to MIR's PBBS at a time. All others must wait.

G. Miles Mann
WF1F @ K1UGM.MA
mann@pictel.com

[Story by G. Miles Mann, WF1F]

* ITAMSAT-OSCAR-26 NEWS *
==========
Sunday October 24th 1993 marked a very important day for ITAMSAT-OSCAR 26. After 28 days in orbit, IO-26 BBS was up and running, and has been accessed by many amateurs around the world.

The initial reports are very encouraging. Even at this low power setting, around 250 mW, the PSK signal is crystal clear and decoding is very easy.

LW2DTZ copied the following beacon frames from the satellite:

ITMSAT-1>TIME-1
PHT: uptime is 021/04:11:44. Time is Sun Oct 24 13:42:57 1993

ITMSAT-1>AMSAT
24 October 1993 - BBS open to users.
Use standard PB and PG software.
73 de ITAMSAT Command Team

Activity on the BBS has just started, but we have already received many enthusiatic comments. Ground stations that had accessed the BBS as of 24-Oct-93 included: I0LYL (which we thank for his kind words), I6CGE, IK2OYD, IK2VOO, IW2EGC, IW4ASO, DL1TV, EA2CLS, OE3EV, ON6UG, WB5FCO and ZS6BMN.

As always, we are waiting for any report from amateurs around the globe!

73 de ITAMSAT Command Team

[Info via Luca Bertagnolio, IK2OVV]

* VE3ONT EME OPERATION NEWS *
==========
The Toronto VHF Society plans to continue its EME (Moonbounce) tests using the 46-meter (150') dish at the Algonquin Provincial Park, Ontario. Operation will be as follows:

Date VE3ONT Approx.
(UTC) TX Freq RX Freq time (UTC)

Saturday, Nov. 6 432.050 432.050-060 0405-1645
Sunday, Nov. 7 1296.050 1296.050-060 0515-1715

The dish can be lowered to about 9 degrees elevation. This decreases the operating time by almost an hour at Moon rise and set. It also limits the ability to work local horizon-only stations.

Equipment: The 432 MHz setup will be significantly better than October's. The receive problem that gave all signals a 120 Hz buzz has been fixed, and the antenna will have about 1 dB more antenna gain due to a redesigned feed helix.

On 1296, VE6ONT will be running about 150 watts output. The feed will be LHCP/RHCP switchable so they ought to be able to work linear and circular polarization stations.

VE6ONT anticipates being able to work stations running 50-100 watts to a long yagi on 432 or 1296. OSCAR-class stations are especially encouraged to try.

Operating suggestions:

Doppler shift will move the apparent VE3ONT frequency a bit. This will make VE3ONT seem to be a little "off frequency," so tune around. Moon echos

will seem to be somewhat high (in frequency) at Moonrise and low at Moonset. We will, however, always transmit on .050.

Note that VE6ONT will be operating "split" so please spread out. In the October operation, some stations were frustrated due to calling VE6ONT on their own frequency, where they weren't listening. Try to use good split-frequency HF DXing technique: listen for the stations that VE3ONT is calling and transmit near their frequency when VE3ONT stands by.

Please avoid duplicate QSOs. The goal is to be "first EME" for as many small stations as possible. "Calling again to say Hi" hurts small stations' chances of making a QSO.

VE3ONT will be operating in "contest" mode. They discovered last month that sequenced operation was not fruitful. They will make every effort to work small and horizon-only stations but will not accept skeds.

HF Liaison: HF propagation from the park is extremely poor. VE6ONT will try to check in to the 20-meter (14.345) EME Net during the day and the 75-meter VHF nets (3.818 & 3.843) at night. Previous attempts to do so were not successful, so don't expect much on HF.

QSL information: QSL to VE3ONT ('93 Callbook address ONLY!) or to Dennis Mungham (VE3ASO), R.R. 3, Mountain, Ontario, Canada K0E 1S0. Color photo QSLs are being prepared.

Michael Owen, W9IP
MOWE@SLUMUS
Fax: (315) 379-5804
Dennis Mungham, VE3ASO

[Info via W9IP]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

G0JJO IW1CXZ N8OAR

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738

U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

303. SAREX Keps & Update 10/30

Newsgroup: rec.radio.amateur.space
Date: 1993-10-30 00:26:43 UTC
From: ABFHB@STDVAX.GSFC.NASA.GOV
Message-ID: <$sts-58.031@ampr.org>
Source record: 28563
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.031
SAREX Keps & Update 10/30

Saturday 10/30/93 @ 00:00 UTC

Since all scheduled SAREX activities are now complete, several general
QSO opportunities are available. While the SAREX Working Group cannot
fully guarantee that the crew will be operating, there is a high
probability that the STS-58 astronauts will be ready to take general calls
over the continental U.S. on these passes. These opportunities include a
pass on orbit 192 at MET 11 days 22 hours and 29 minutes (10/30 at 13:22 UTC)
and a pass on orbit 193 at MET 12 days 0 hours 6 minutes (10/30 at 14:49 UTC).
Please note that many hams on the ground heard or worked the Shuttle Columbia
crew on several orbits today. Both voice and packet modes were operating.

Element set GSFC-031, generated by Ron Parise, WA4SIR, will continue to be
the official SAREX element set for today. On orbit 181 Gil Carman, WA5NOM,
of the Johnson Space Center compared the orbiter state vector to GSFC-031.
The state vector was 6 seconds later than this element set. Other later
element sets (e.g. GSFC-038) are currently less accurate than GSFC-031.

STS-58
1 22869U 93065A 93300.17699070 0.00133671 99048-5 24183-3 0 318
2 22869 39.0252 71.9896 0012817 34.2105 325.9529 16.00500857 1383

Satellite: STS-58
Catalog number: 22869
Epoch time: 93300.17699070 (27 OCT 93 04:14:51.** UTC)
Element set: GSFC-031
Inclination: 39.0252 deg
RA of node: 71.9896 deg Space Shuttle Flight STS-58
Eccentricity: 0.0012817 Keplerian Elements
Arg of perigee: 34.2105 deg
Mean anomaly: 325.9529 deg
Mean motion: 16.00500857 rev/day Semi-major Axis: 6651.1630 Km
Decay rate: 0.13E-02 rev/day*2 Apogee Alt: 281.30 Km
Epoch rev: 138 Perigee Alt: 264.25 Km

NOTE - This element set is based on NORAD element set # 031.
The spacecraft has been propagated to the next ascending
node, and the orbit number has been adjusted to bring it
into agreement with the NASA numbering convention.

Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group

/EX

304. SAREX Keps/Update 10/30

Newsgroup: rec.radio.amateur.space
Date: 1993-10-30 17:06:11 UTC
From: ABFHB@STDVAX.GSFC.NASA.GOV
Message-ID: <$sts-58.032@ampr.org>
Source record: 28564
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAREX @ AMSAT $STS-58.032
SAREX Keps/Update 10/30

Saturday 10/30/93 @ 17:00 UTC

We have recently learned that SAREX will remain active on the Space Shuttle Columbia until 16:53 UTC on October 31. KC5ACR, (Bill McArthur) KC5AXA (Marty Fettman) and KC5CKM (Rick Searfoss) will continue voice operations today and tomorrow as time permits. Also, the packet robot system, using the callsign W5RRR-1, should be operational when the STS-58 crew is busy doing science investigations. Good luck!

Element set GSFC-031, generated by Ron Parise, WA4SIR, will continue to be the official SAREX element set for today. On orbit 191 Gil Carman, WA5NOM, of the Johnson Space Center compared the orbiter state vector to GSFC-031. The state vector was 4 seconds later than this element set.

STS-58
1 22869U 93065A 93300.17699070 0.00133671 99048-5 24183-3 0 318
2 22869 39.0252 71.9896 0012817 34.2105 325.9529 16.00500857 1383

Satellite: STS-58
Catalog number: 22869
Epoch time: 93300.17699070 (27 OCT 93 04:14:51.** UTC)
Element set: GSFC-031
Inclination: 39.0252 deg
RA of node: 71.9896 deg Space Shuttle Flight STS-58
Eccentricity: 0.0012817 Keplerian Elements
Arg of perigee: 34.2105 deg
Mean anomaly: 325.9529 deg
Mean motion: 16.00500857 rev/day Semi-major Axis: 6651.1630 Km
Decay rate: 0.13E-02 rev/day*2 Apogee Alt: 281.30 Km
Epoch rev: 138 Perigee Alt: 264.25 Km

NOTE - This element set is based on NORAD element set # 031.
The spacecraft has been propagated to the next ascending
node, and the orbit number has been adjusted to bring it
into agreement with the NASA numbering convention.

Submitted by Frank H. Bauer, KA3HDO for the SAREX Working Group

/EX

305. ANS-303 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-10-31 22:36:35 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-303.01@ampr.org>
Source record: 28565
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-303.01
STS-58 SAREX MISSION ENDS

HR AMSAT NEWS SERVICE BULLETIN 303.01 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 30, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-303.01

STS-58 Astronuats Breaks All SAREX Records

Now that the Space Shuttle Columbia Astronauts have packed away the Shuttle Amateur Radio Experiment (SAREX) gear, it can be said that this SAREX flight was one of the most successful performed to date. All facets of this SAREX flight were performed superbly. This was a testament of the outstanding support and preparation by the Astronauts on-orbit and the SAREX team on the ground. For the DX chaser, this mission will probably be remembered for the special effort that was made on the part of the astronauts to make as many general voice QSO contacts as their busy schedule would allow. The astronauts were available on voice for all the "scheduled" general QSO opportunities and many additional passes. Estimates of the number of voice contacts are difficult without hearing the tape logs but are probably in the high hundreds. With respect to packet QSOs, well over 800 at this time is a good estimate. Until the SAREX logs have been completely examined, these are only preliminary estimates.

One important facet of SAREX is school group contacts. This mission shined from a school group success standpoint. Of the 17 school groups and 8 personal contacts planned, only 2 school group and 1 personal contacts had to be repeated. The probability of a successful school contact on the first attempt was nearly 90% for this mission. During previous missions, our success rate was between 66-75%. Also, the majority of the schools had horizon to horizon contacts and many schools had 10 or more questions answered. Hundreds of school children were thrilled by the experience of talking directly with the STS-58 astronauts and asking questions about various aspects of space flight. Many thousand more were also able to listen into the conversation. On 21-OCT-93, the Lycee Gaston Febus school in Pau, France had a telebridge contact with the astronauts. Jean-Marc Dumont, the French school coordinator reports that over 10,000 students throughout France listened to the contact through a national repeater link. The SAREX Working Group wishes to thank the school group volunteers for their outstanding efforts, the ARRL for their educational lesson plans and education support, the AMSAT technical mentors who coached the schools prior to the contact, and those who helped in the Mission Control Customer Support room; particularly John Nickel (WD5EEV), and Karen Nickel (WD5EEU).

If you heard or worked the STS-58 station of KC5ACR or W5RRR-1 and you would like to receive a QSL card, then please send your QSL card to the following address: ARRL, STS-58 QSL, 225 Main Street, Newington, CT, 06111. Please allow for up to 6-10 months for the STS-58 SAREX Mission QSL card to be mailed. Please include with your QSL card all the specific QSO information such as, date, time, mode, frequency, etc. Also, and most importantly, if you wish to receive a QSL card confirming a contact, YOU MUST INCLUDE A SELF-ADDRESS-STAMPED-ENVELOPE (SASE) WITH PROPER POSTAGE! If you do not include a SASE, you will not receive a QSL card.

A great deal of recognition should be given to the hard work done by the SAREX Working Group which listened to the feedback from radio amateurs from previous SAREX missions and worked very hard improve operations. Also, a big "thanks" is due to the astronauts aboard STS-58; particularly Bill McArthur (KC5ACR), Marty Fettman (KC5AXA), and Rick Searfoss, (KC5CKM).

In the upcoming weeks as the SAREX logs are analyzed by the SAREX Team, the AMSAT News Service (ANS) bulletins will publish final STS-58 operational statistics.

[The AMSAT News Service (ANS) would like to thank Frank Bauer (KA3HDO) for the information which went into this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-303.02
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 303.02 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 30, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-303.02

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

13-Nov-93 1230 B 146 VE2LVC W5IU
28-Nov-93 0230 B 39 WJ9F VE2LVC
12-Dec-93 0435 B 180 W9ODI WB6LLO

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-303.03
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 303.03 FROM AMSAT HQ
SILVER SPRING, MD OCTOBER 30, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-303.03

Weekly OSCAR Status Reports: 23-OCT-93

AO-13: Current Transponder Operating Schedule:
M QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Oct 25-Nov 15
Mode-B : MA 0 to MA 130 !
Mode-BS : MA 130 to MA 180 !
Mode-S : MA 180 to MA 205 !<- S transponder; B trsp. is OFF
Mode-S : MA 205 to MA 210 !<- S beacon only
Mode-BS : MA 210 to MA 226 ! Blon/Blat 210/0
Omnis : MA 240 to MA 80 ! Move to attitude 240/0, Nov 15
Please don't uplink to Mode-B between MA 180-205 as this interferes with Mode-S transponder operations. Continuous up-to-date information about AO-13 operations is always avail-able on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, as well as many international newsletters. [G3RUH/DB2OS/VK5AGR]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

LO-19: Operating normally. [WH6I]

KO-23: Up and running. Busy as usual. [WH6I]

KO-25: File system is up and running but not open for uploads. [WH6I]

IO-26: Up and running with a lot of activity. [WH6I]

NOTE: All of the above digital "birds" are now using the new suite of programs. They all broadcast both directories and files. PB920430 works with all of them. [WH6I]

AO-10: SM0MRJ reports that last week downlink signals are quite strong from AO-10 but there are almost no users taking advantage of this OSCAR. [SM0MRJ]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO

area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

306. APT-Satellites: Report NOV 01, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-03 08:27:31 UTC
From: peter.henne@gmd.de
Message-ID: <1993Nov3.082731.26248@gmd.de>
Source record: 28566
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, NOV 01, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 On
Meteor 3-3: APT 137.30 On

NOAA-10 is in VHF-conflict with NOAA-12, N10-APT is off.
The Signal of Meteor 2-21 is weak as before, I think
there is no hope that this will become better. Meteor 3-3
transmits good vis-images from noon-descending passes.
```


```
+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

307. Two-Line Orbital Element Set Format

Newsgroup: rec.radio.amateur.space
Date: 1993-11-05 22:56:32 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.752540192@afit.af.mil>
Source record: 28567
Cross-posted to: rec.radio.amateur.space,rec.radio.info

As a service to the satellite user community, the following description of the NORAD two-line orbital element set format is uploaded to sci.space.news and rec.radio.info on a monthly basis. The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity. In addition, element sets (also updated daily) and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

==========

Data for each satellite consists of three lines in the following format:

```
AAAAAAAAAAA
1 NNNNNU NNNNNAAA NNNNN.NNNNNNNN +.NNNNNNNN +NNNNN-N +NNNNN-N N NNNNN
2 NNNNN NNN.NNNN NNN.NNNN NNNNNNN NNN.NNNN NNN.NNNN NN.NNNNNNNNNNNNN
```

Line 0 is a eleven-character name.

Lines 1 and 2 are the standard Two-Line Orbital Element Set Format identical to that used by NORAD and NASA. The format description is:

```
Line 1
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
10-11 International Designator (Last two digits of launch year)
12-14 International Designator (Launch number of the year)
15-17 International Designator (Piece of launch)
19-20 Epoch Year (Last two digits of year)
21-32 Epoch (Julian Day and fractional portion of the day)
34-43 First Time Derivative of the Mean Motion
or Ballistic Coefficient (Depending on ephemeris type)
45-52 Second Time Derivative of Mean Motion (decimal point assumed;
blank if N/A)
54-61 BSTAR drag term if GP4 general perturbation theory was used.
Otherwise, radiation pressure coefficient. (Decimal point assumed)
63-63 Ephemeris type
65-68 Element number
69-69 Check Sum (Modulo 10)
(Letters, blanks, periods, plus signs = 0; minus signs = 1)
```

Line 2
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
09-16 Inclination [Degrees]
18-25 Right Ascension of the Ascending Node [Degrees]
27-33 Eccentricity (decimal point assumed)
35-42 Argument of Perigee [Degrees]
44-51 Mean Anomaly [Degrees]
53-63 Mean Motion [Revs per day]
64-68 Revolution number at epoch [Revs]
69-69 Check Sum (Modulo 10)

All other columns are blank or fixed.

Example:

NOAA 6
1 11416U 86 50.28438588 0.00000140 67960-4 0 5293
2 11416 98.5105 69.3305 0012788 63.2828 296.9658 14.24899292346978

308. Two-Line Orbital Element Sets (TLE289)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-05 22:59:01 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.752540341@afit.af.mil>
Source record: 28568
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #289 -
Alouette 1
1 00424U 62049 93305.63605382 .00000079 00000-0 89543-4 0 9106
2 00424 80.4663 149.5140 0023487 342.4677 17.5655 13.67785920551299
ATS 3
1 03029U 67111A 93307.12284649 -.00000076 00000-0 10000-3 0 1088
2 03029 14.4925 9.7850 0011665 256.8377 74.6222 1.00272955 95162
Cosmos 398
1 04966U 71016A 93308.82477205 .00089625 33027-4 22794-3 0 7622
2 04966 51.4438 97.9745 1245390 84.0425 290.0905 13.36900223742153
Starlette
1 07646U 75010A 93305.54661963 -.00000047 00000-0 10333-4 0 7080
2 07646 49.8293 331.6575 0205740 304.3821 53.7766 13.82184401946352
LAGEOS
1 08820U 76039A 93305.26521712 -.00000001 00000-0 10000-3 0 9108
2 08820 109.8578 57.5087 0044241 333.8509 25.9845 6.38664542152595
ETS-2
1 09852U 77014A 93294.44087169 .00000138 00000-0 10000-3 0 9041
2 09852 11.7254 44.3981 0002167 91.7104 270.6736 1.00005386 8274
GOES 2
1 10061U 77048A 93307.84368399 .00000111 00000-0 10000-3 0 2143
2 10061 10.7764 48.4684 0002869 35.0166 127.7222 1.00262863 4853
IUE
1 10637U 78012A 93307.29850843 -.00000175 00000-0 00000+0 0 9102
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1 10684U 78020A 93308.06163043 -.00000014 00000-0 10000-3 0 2052
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2 11783 62.7984 285.8109 0205062 29.1708 331.9589 2.03456878 99361
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2 12472 6.3383 60.7265 0003853 11.9750 355.8340 1.00228542 3408
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UoSat 2
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Kvant-1
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1 18123U 87 53 A 93298.44813632 .00000656 00000-0 35592-3 0 1097
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2 18312 82.5579 32.3229 0013788 34.0943 326.1100 13.84010904313587
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2 18820 82.5395 89.7759 0017369 97.5771 262.7364 13.84696069290834
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1 18822U 88 6 A 93298.41253267 -.00000008 00000-0 46717-5 0 2109
2 18822 98.4668 157.7119 0005841 318.6274 41.7338 14.22889737297133
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METEOSAT 3
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2 19215 1.2377 73.5274 0003427 222.1071 78.4197 1.00272173 7645
AO-13
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2 19216 57.9066 286.1519 7212798 327.5952 3.5951 2.09718076 9760
OKEAN 1
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2 19274 82.5123 88.7290 0021560 41.3890 318.8952 14.81991313287349
Meteor 3-2
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2 19336 82.5396 124.7724 0017722 109.4807 250.8231 13.16961800253299
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NOAA 11
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TDRS 2
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Glonass 41
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TDRS 3
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2 20061 54.7600 325.7076 0125319 204.9060 154.5222 2.00566248 32239
Nadezhda 1
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2 20103 82.9577 95.6822 0036475 203.1871 156.7640 13.73827655217045
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2 20185 54.8991 149.3742 0006678 228.7164 131.3087 2.00553634 30803
GMS 4
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Meteor 3-3
1 20305U 89086A 93305.34380136 .00000043 00000-0 10000-3 0 9103
2 20305 82.5448 68.1007 0016603 130.0738 230.1843 13.16022865193146
COBE
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Kvant-2
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SPOT 2
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Meteor 3-5
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UARS
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2 21701 56.9842 352.6445 0005527 86.5474 273.6229 14.96241514116791
DMSP B5D2-6
1 21798U 91082A 93307.96392323 .00000121 00000-0 74080-4 0 9667
2 21798 98.9595 308.3275 0013809 56.2894 303.9600 14.13727708 99792
Glonass 53
1 21853U 92005A 93307.41232712 .00000028 00000-0 10000-3 0 8093
2 21853 64.8501 116.7146 0006581 192.8908 167.1090 2.13102663 13730
Glonass 54
1 21854U 92005B 93309.11295862 .00000027 00000-0 00000+0 0 8306
2 21854 64.8572 116.6394 0016250 20.6969 339.3859 2.13103152 13754
Glonass 55
1 21855U 92005C 93308.23465463 .00000027 00000-0 00000+0 0 8237
2 21855 64.8571 116.6730 0007347 190.9043 169.0965 2.13102097 13729
JERS-1
1 21867U 92007A 93307.21128003 .00001189 00000-0 10384-3 0 1249
2 21867 97.6645 21.2082 0001388 123.8868 236.2487 14.98654611 94532
GPS BIIA-12
1 21890U 92009A 93306.91234421 -.00000016 00000-0 10000-3 0 4107
2 21890 54.2704 266.0729 0056897 159.2884 200.9323 2.00561571 12434
GPS BIIA-13
1 21930U 92019A 93305.12891674 -.00000029 00000-0 10000-3 0 4108
2 21930 55.4969 26.9510 0059469 164.7089 195.5020 2.00562536 11335
EUVE
1 21987U 92031A 93307.87037057 .00001579 00000-0 71196-4 0 2107
2 21987 28.4328 124.9589 0010984 31.3190 328.8069 15.17740658 78110
SAMPEX
1 22012U 92038A 93308.75775678 .00001434 00000-0 12150-3 0 4139
2 22012 81.6746 47.1720 0119674 50.5952 310.5781 14.91786309 72862
GPS BIIA-14
1 22014U 92039A 93306.16268882 .00000008 00000-0 10000-3 0 3103
2 22014 54.9181 206.7899 0083229 293.0368 66.1654 2.00573210 3185
Glonass 56
1 22056U 92047A 93308.13558757 -.00000018 00000-0 00000+0 0 7246
2 22056 64.9251 356.7057 0006901 261.8247 98.1662 2.13103366 9807
Glonass 57
1 22057U 92047B 93306.08297269 -.00000017 00000-0 00000+0 0 7257
2 22057 64.9363 356.7887 0007931 306.1521 53.8463 2.13103020 9764
Glonass 58
1 22058U 92047C 93308.37042339 -.00000018 00000-0 00000+0 0 7271
2 22058 64.9328 356.7188 0011397 270.9197 89.0422 2.13103464 9845
TOPEX
1 22076U 92052A 93307.55620201 -.00000001 00000-0 10000-3 0 6654
2 22076 66.0406 39.6610 0007998 262.1792 97.8314 12.80930426 57580
KITSAT-A
1 22077U 92052B 93305.58451707 .00000000 00000-0 10000-3 0 3069
2 22077 66.0810 36.5184 0004304 343.4855 16.6013 12.86281631 57503
S80/T
1 22078U 92052C 93305.64231367 .00000000 00000-0 10000-3 0 3065
2 22078 66.0808 35.9222 0005135 354.4168 5.6791 12.86563108 57579
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TOPEX R/B
1 22079U 92052D 93305.62426823 -.00000002 00000-0 10000-3 0 3060
2 22079 66.0714 50.3370 0074967 298.1957 61.1480 12.77664847 57271
GPS BIIA-15
1 22108U 92058A 93308.12014538 -.00000015 00000-0 10000-3 0 3113
2 22108 54.4838 266.6747 0104837 132.7020 228.1799 2.00568471 8406
FREJA
1 22161U 92064A 93305.64348869 -.00000031 00000-0 82103-5 0 3090
2 22161 63.0078 148.2218 0773878 295.0352 57.2251 13.21680625 51710
LAGEOS II
1 22195U 92070B 93306.38793988 -.00000004 00000-0 10000-3 0 2096
2 22195 52.6508 237.0317 0137816 18.4742 342.0760 6.47293868 24250
GPS BIIA-16
1 22231U 92079A 93307.30904169 .00000008 00000-0 10000-3 0 3122
2 22231 54.7871 208.0228 0038036 295.3963 64.3670 2.00566098 6966
GPS BIIA-17
1 22275U 92089A 93305.95243533 .00000008 00000-0 10000-3 0 3121
2 22275 54.6715 205.6279 0044224 256.0539 103.5890 2.00570128 6349
TDRS 5
1 22314U 93003B 93308.08899374 -.00000255 00000-0 10000-3 0 3124
2 22314 0.6006 72.1757 0002611 195.5553 101.8904 1.00552312 3070
GPS BIIA-18
1 22446U 93007A 93308.02292722 -.00000024 00000-0 10000-3 0 3115
2 22446 54.7798 326.5244 0068396 335.9208 23.8058 2.00554698 5413
Glonass 59
1 22512U 93010A 93306.47428723 .00000028 00000-0 00000+0 0 4278
2 22512 64.8697 116.5821 0009819 187.8570 172.1717 2.13103652 5285
Glonass 60
1 22513U 93010B 93307.35359048 .00000028 00000-0 00000+0 0 4292
2 22513 64.8539 116.5649 0007556 185.4303 174.5820 2.13102576 5503
Glonass 61
1 22514U 93010C 93305.24250631 .00000030 00000-0 00000+0 0 4212
2 22514 64.8715 116.6276 0014180 184.2219 175.7755 2.13101787 5469
ASTRO-D
1 22521U 93011A 93305.50692356 .00001224 00000-0 10208-3 0 2099
2 22521 31.1012 65.4422 0077793 28.8441 331.6458 14.92673564 38036
UHF F1
1 22563U 93015A 93292.88575193 .00000058 00000-0 10000-3 0 2054
2 22563 27.0620 303.2814 0008127 266.3173 209.1561 0.99247280 403
GPS BIIA-19
1 22581U 93017A 93306.67479408 -.00000028 00000-0 10000-3 0 2116
2 22581 54.9937 26.7534 0038113 27.8041 332.4752 2.00561467 4407
ProgressM17
1 22588U 93019A 93309.19584616 .00021291 00000-0 19337-3 0 3323
2 22588 51.6214 226.4704 0002345 308.2329 51.8457 15.67934905 34200
ARSENE
1 22654U 93031B 93307.87458422 -.00000047 00000-0 10000-3 0 2064
2 22654 1.4047 114.5073 2932585 159.9734 215.1574 1.42202783 2556
GPS BIIA-20
1 22657U 93 32 A 93293.34104706 -.00000026 00000-0 99999-4 0 2058
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2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21
1 22700U 93042A 93308.76701401 -.00000015 00000-0 10000-3 0 2105
2 22700 54.6502 267.3475 0025397 303.7989 55.9553 2.00569962 2580
Soyuz TM-17
1 22704U 93043A 93308.04974758 .00042187 00000-0 52717-3 0 2216
2 22704 51.6178 236.8404 0005352 1.3286 357.4026 15.59390444440950
NOAA 13
1 22739U 93050A 93308.33874566 -.00000013 00000-0 27706-5 0 2057
2 22739 98.9206 248.9270 0010835 38.8503 321.3425 14.10859776 12253
GPS BIIA-22
1 22779U 93054A 93308.35289528 -.00000024 00000-0 10000-3 0 2144
2 22779 54.8995 326.3679 0028187 226.0158 133.8019 2.00555333 1333
Meteor 2-21
1 22782U 93055A 93305.69077331 .00000097 00000-0 83607-4 0 2086
2 22782 82.5501 26.7162 0022599 139.9349 220.3485 13.82989496 8644
SPOT 3
1 22823U 93061A 93308.24072627 -.00000646 00000-0 -29510-3 0 2125
2 22823 98.7398 20.8592 0000968 94.2690 265.8597 14.20012800 5557
STELLA
1 22824U 93061B 93306.37728182 -.00000037 00000-0 -70798-5 0 2087
2 22824 98.6838 19.1927 0005888 140.9606 219.1982 14.27092516 5314
KO-25
1 22825U 93061C 93305.38322237 .00000057 00000-0 31218-4 0 2082
2 22825 98.6783 18.2116 0008754 149.2634 210.9045 14.27587035 5170
POSAT-1
1 22826U 93061D 93305.66096033 .00000076 00000-0 39017-4 0 2093
2 22826 98.6791 18.4934 0009019 149.5441 210.6266 14.27689613 5227
HEATHSAT
1 22827U 93061E 93305.65837552 .00000067 00000-0 35158-4 0 2083
2 22827 98.6762 18.4829 0009614 137.4787 222.7140 14.27789791 5222
ITAMSAT
1 22828U 93061F 93298.72095112 -.00001003 00000-0 -39821-3 0 2073
2 22828 98.6784 11.5963 0007797 161.6086 197.8553 14.27736575 4233
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93305.72284171 .00000098 00000-0 47343-4 0 2092
2 22830 98.5806 18.2166 0012009 119.7937 240.4440 14.28013237 5235
ProgressM20
1 22867U 93064A 93308.04974758 .00042187 00000-0 52717-3 0 138
2 22867 51.6178 236.8404 0005352 1.3286 357.4026 15.59390444440950
1993 066A
1 22871U 93066A 93305.20981547 -.00000335 00000-0 00000+0 0 150
2 22871 0.0416 230.3031 0021891 71.0128 295.4491 1.00247170 146
1993 067A
1 22875U 93067A 93303.20652166 .00008787 00000-0 18719-3 0 85
2 22875 82.9393 255.1426 0876648 101.9285 268.1432 13.89006609 525
1993 067B
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1 22876U 93067B 93307.59325993 .00010536 00000-0 21380-3 0 147
2 22876 82.9401 251.7530 0874490 88.7280 281.3700 13.90406862 1134
GPS BIIA-23
1 22877U 93068A 93308.97342994 .00000003 00000-0 10000-3 0 103
2 22877 55.0709 87.4601 0044912 177.5935 182.4251 2.02328285 226
1993 068B
1 22878U 93068B 93307.21875624 .00005581 00000-0 21111-3 0 89
2 22878 35.1524 17.3969 0059432 232.1961 127.3372 15.24647052 1137
1993 069A
1 22880U 93069A 93308.39997811 -.00000198 00000-0 10000-3 0 159
2 22880 1.4781 276.0644 0004815 312.3512 48.7820 1.00270001 85
1993 069D
1 22883U 93069D 93302.41277744 -.00000264 00000-0 10000-3 0 14
2 22883 1.5627 278.5623 0011829 335.2585 23.3984 1.00483378 26
1993 069E
1 22884U 93069E 93303.44663398 .00000245 00000-0 10000-3 0 22
2 22884 47.4151 274.9273 7279479 0.3271 359.8094 2.27726716 64
1993 069F
1 22885U 93069F 93303.44932421 .00000072 00000-0 10000-3 0 16
2 22885 47.4649 274.9561 7259336 0.3203 359.8061 2.27330482 78
Unknown
1 22887U 93308.81978845 .00040950 00000-0 51924-3 0 61
2 22887 51.6202 232.9794 0006127 28.1079 332.0243 15.59012655441054
1993 070A
1 22888U 93070A 93307.51255370 .00000463 00000-0 47654-3 0 103
2 22888 82.9510 251.7136 0047158 292.3341 67.3081 13.74206622 153
1993 070B
1 22889U 93070B 93308.60224552 .00027165 00000-0 27755-1 0 110
2 22889 82.9491 250.9077 0039459 283.7673 75.9101 13.75916453 298
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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309. Re: Oscar 21 Question

Newsgroup: rec.radio.amateur.space
Date: 1993-11-06 11:19:32 UTC
From: alwalsh@copper.ucs.indiana.edu
Message-ID: <CG2I4L.9Hv@usenet.ucs.indiana.edu>
Source record: 28569

In article <2bbgf4INNfj7@mickey.eng.gulfaero.com>,
John Gladin <gladin@gulfaero.com> wrote:
>I have just recently started listening in on Oscar21 passes on 145.983
>MHz. Could someone please explain the 'mode flipping' between QSOs,
>German, French, etc 'broadcasts', and packet? I'm trying to learn the
>ropes before attempting contacts and I do intend on reading up on the
>subject. However, I'm running long on curiosity and short on time for
>researching my new-found habit.
>
>Your help is appreciated.
>
>Regards,
>John KE4GHE
>

OSCAR 21 operates in three different modes during each ten minute cycle.
For the first 6 minutes it operates in mode B (70cm up, 2m down), essentially
as a repeater. For the next three minutes it broadcasts automated voice
messages in various langauges. The last minute is packet data. When you
get a chance, check out the excellent QST article on OSCAR 21 in the
December issue.

-Alan
KF9KQ

310. Re: Oscar 21 Question

Newsgroup: rec.radio.amateur.space
Date: 1993-11-07 15:43:12 UTC
From: dbraun@ilx049.intel.com
Message-ID: <2bj52g$10pf@ilx018.intel.com>
Source record: 28570

In article <CG2I4L.9Hv@usenet.ucs.indiana.edu>, alwalsh@copper.ucs.indiana.edu (Alan Walsh) writes:

|> OSCAR 21 operates in three different modes during each ten minute cycle.
|> For the first 6 minutes it operates in mode B (70cm up, 2m down), essentially
|> as a repeater.

A question here: In mode B, is it operating as a linear transponder
(albeit with a very narrow passband), or as a true FM repeater?

Listening to it, I usually hear a mess that sounds like 20 FM stations
all transmitting on the same frequency, but I can't tell if
my radio is hearing 20 stations through the linear transponder,
or if AO-21 is hearing 20 stations, and repeating what it sounds like
at its FM detector.

--

Doug Braun Intel Israel, Ltd. M/S: IDC1-41
Tel: 011-972-4-655069 dbraun@inside.intel.com

311. ANS-310 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-11-07 17:20:50 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-310.01@ampr.org>
Source record: 28571
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-310.01
DOVE-OSCAR-17 RETURNS TO 2M!

HR AMSAT NEWS SERVICE BULLETIN 310.01 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-310.01

DOVE-OSCAR-17 (DO-17) Returns To 2M: DOVE RECOVERY BEGINS!

DOVE is currently up and running on 2M. It is sending normal ASCII tele-
metry and a short text bulletins on 145.825 MHz. A very quick look at
telemetry indicates the spacecraft is basically healthy. The DOVE Recovery
Team of Bob Diersing (N5HAD), Bill McCaa (K0RZ), and Jim White (WD0E) have
been working very intensively for about 10 days to create and test new
software that allowed automated software loading via 2M in a half-duplex
mode. This replaces the "ear-ack on S-Band" method N4HY had used in the
past that was so difficult as to be a barrier to recovery.

WD0E and the DOVE Recovery Team would like to receive telemetry reports.
Please send them to vk7zbx@KO-23, @AO-16 or on INTERNET to vk7zbx@amsat.org
or to wd0e@amsat.org, or to the CompuServe address of 71477,546. The most
recent version of TLMDCII (3-8-92) will decode and record DOVE telemetry
very nicely. For more information about obtaining a copy of the TLMDC
program, contact AMSAT-NA HQs at (301) 589-6062. After the DOVE Recovery
Team is sure the satellite is stable in this configuration and the RF
transmitter power targets are established, the next step will be to load up
through PHTX and test the voice module. Depending on the condition of the
spacecraft and other issues, this could take several weeks.

WD0E would like to express sincere thanks to Bob Diersing for all of his
hard work creating a RAM loader, and Bill McCaa for the many passes of S-
band and two meter receive he provided (often late into the night). It
could not have been done without their enthusiastic efforts. Also, thanks
to Harold Price (NK6K) for providing the the developement system hardware,
software, and a good deal of coaching. His contributions were invaluable.

Given a reasonably healthy satellite, WD0E is confident we can make DOVE
talk as he described at the AMSAT-NA Space Symposium in Dallas a few weeks
ago.

[The AMSAT News Service (ANS) would like to thank Jim White (WD0E) for this
bulletin item. If you would like to send DOVE telemetry to Jim, again, his
INTERNET address is wd0e@amsat.org and his CompuServe address is 71477,546.]

/EX
SB SAT @ AMSAT $ANS-310.02
ITAMSAT-OSCAR-26 STATUS REPORT

HR AMSAT NEWS SERVICE BULLETIN 310.02 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-310.02

IW3QOK Provides An Update On ITAMSAT-OSCAR-26 (IO-26)

First of all IW3QOK wants to apologize to all those who have sent their status reports and telemetry data about IO-26 satellite to him without having had any response come back from him. IW3QOK reports that he has not enough time to read all the messages to answer each individually, nor to follow the all the discussions concerning IO-26. For those who have sent in these telemetry and status reprots to IW3QOK, he notes that he has found them to be quite invaluable and they contribute greatly to making IO-26 an even more interesting and useful satellite from the user's point of view.

The telemetry data received so far shows that all systems are working properly and that IO-26 is presently in a good health. The Bulletin Board System (BBS) has been opened, as the most of you already know, and the number of users of IO-26 is growing rapidly as each day passes.

It is well known that IO-26 is presently in a state of low power consumption, and consequently the RF power output from the transmitter is about 250 mW. This is NOT a problem, but has been implemented because of battery considerations and also because its signal is already very good and quite readable. Two days ago an Italian command station, in Milano, increased the RF output power of the 70cm transmiter to its maximum value (approx. 4W) as a test for a few minutes. Everything worked fine during this test. The Battery Charge Regualator (BCR) is working well and the solar panels are charging the batteries regularly. Recently IW3QOK received some questions about why the array voltage was so low (around 11V) with respect to the other MICROSATs. The answer is very simple: IO-26 uses highly efficient solar array panels that have a lower voltage than those used on the other MICROSATs so it is not necessary for you to worry about this issue. Another question which IW3QOK receives many inquiries about is the very high value presented by the Error Detection And Correction (EDAC) telemetry counter. His theory is that there must be a little "bug" in the telemetry sofware and ITAMSAT's main working group (in Milano) is already working to solve this problem.

>From all the very interesting telemetry data IW3QOK has received from many countries, it has been possible to understand that the IO-26's spacecraft attitude and to see that its motion is quite predictable. The results will be presented soon in a readable form. All IO-26 users are invited to download the Whole Orbit Data (WOD) and analyze it. The downloading of this WOD file is simple and one can easily deduce the spacecraft's motion by examining carefully the telemetry items related to the solar array currents or voltages using any common spreadsheet program, such as, Excel, Lotus 123,

or QuattroPro. By graphing these telemetry items, one can easily see how these currents or voltages behave as the spacecraft attitude rotates as goes into and out of eclipses.

Again IW3QOK would like thank all those who have sent him telemetry and it is his hope that you will continue to enjoy using IO-26.

[The AMSAT News Service (ANS) would like to thank IW3QOK for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-310.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 310.03 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-310.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

13-Nov-93 1230 B 146 VE2LVC W5IU
28-Nov-93 0230 B 39 WJ9F VE2LVC
12-Dec-93 0435 B 180 W9ODI WB6LLO

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-310.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 310.04 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 6, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-310.04

Weekly OSCAR Status Reports: 06-NOV-93

AO-13: Current Transponder Operating Schedule:
M QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Oct 25-Nov 15
Mode-B : MA 0 to MA 130 !
Mode-BS : MA 130 to MA 180 !
Mode-S : MA 180 to MA 205 !<- S transponder; B trsp. is OFF
Mode-S : MA 205 to MA 210 !<- S beacon only
Mode-BS : MA 210 to MA 226 ! Blon/Blat 210/0
Omnis : MA 240 to MA 80 ! Move to attitude 240/0, Nov 15
Please don't uplink to Mode-B between MA 180-205 as this interferes with Mode-S transponder operations. Continuous up-to-date information about AO-13 operations is always available on the beacons at 145.812 MHz and 2400.646 MHz in CW, RTTY and 400 bps PSK. Also, these bulletins are also posted to INTERNET, ANS bulletins, Packet, PACSATs, as well as many international newsletters. In additional notes about AO-13, G3RUH reports the following: the partial solar eclipse of 13-NOV-93 [Sat] (visible from Antarctica) also affects AO-13. AO-13 will see the Moon eclipse the Sun from 13:33 - 15:13 UTC with a maximum of 89% obscuration at 14:16 UTC. This will be Orbit 4148, with MA 171-208. The encounter will be "visible" on the spacecraft telemetry to stations in the entire Pacific area, Australia and Japan, and the US west coast. US stations east of Salt Lake City will have LOS during the encounter, seeing less the further east they are. AO-13 is not in view of Europe at this time. It will not be necessary to shut down the transponders on this occasion because Mode-S is ON, and consumes little power. The 145 MHz telemetry beacon will be available up to MA 205 and will continue on S-band. The Whole Orbit Data (WOD) collection facility will dwell on battery voltage at 1 MA intervals. On the issue of Solar Eclipses by the sun: these commence on 07-DEC-1993 [Tue] and continue until 24-DEC-93 [Fri]. These eclipses are of course total. The maximum lasts 136 minutes, and is the longest AO-13 has ever experienced. The Mode-B transponder will be OFF from MA 95 to 180 during this two week period. The WOD collection facility will dwell on interesting sensor points. Anybody requiring a specific value to be monitored should contact a command station with details of parameter wanted, start time, and MA interval. Up to 384 samples can be taken per K-block. [G3RUH/DB2OS/VK5AGR]

DOVE: DO-17 currently sending AX.25 packet telemetry on a downlink frequency of 145.825 MHz. [WD0HHU]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

LO-19: Operating normally. [WH6I]

KO-23: Up and running. Busy as usual. [WH6I]

KO-25: File system is up but not open for uploads. It appears that the satellite has taken an EIS image but it is not available. [WH6I]

AO-27: No information received but it is assumed that this spacecraft is still in the testing phase. ANS will present further information when received. [W3XO]

IO-26: Up and running with a lot of activity. The signal is weaker than AO-16 or LO-19 but good throughput is still possible. The following table is just a "quick-review" of the IO-26 frequencies: TXA PSK= 435.867 MHz, TXB PSK/FM=435.827 MHz, RX #1=145.875 MHz, RX #2= 145.900 MHz, RX #3=145.925 MHz, RX #4=145.950 MHz. [IK2OVV]

FO-20: The following is the transponder operating schedule for the month of November and December:
ANALOG Mode-J Voice & CW Operations:
10-NOV-93 09:23 -TO- 11-NOV-93 07:51 UTC
17-NOV-93 07:44 -TO- 18-NOV-93 08:15 UTC
24-NOV-93 08:20 -TO- 25-NOV-93 08:38 UTC
01-DEC-93 08:43 -TO- 08-DEC-93 07:16 UTC
15-DEC-93 07:41 -TO- 22-DEC-93 08:05 UTC
Please note that that at all other times FO-20 will be in the digital BBS mode. In December, the analog transponder and digital transponder will each be turned-on for a week period, ALTERNATELY! For those who want to try working FO-20 in the voice mode the following are the passband frequencies of the analog transponder: Uplink passband: 145.900 MHz --> 146.000 MHz. Downlink passband: 435.900 MHz --> 435.800 MHz. The telemetry beacon can be heard at 435.795 MHz. The analog transponder inverts all up-linked signals. LSB on the uplink becomes USB on the downlink. A signal in the lower portion of the uplink passband appears in the upper portion of the downlink passband. For more information, see the September QST, p 104. [JJ1WTK/3]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

312. Sat access to Internet ?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-08 06:38:44 UTC
From: rgallen@muug.mb.ca
Message-ID: <1993Nov8.063844.11523@muug.mb.ca>
Source record: 28572

This may be a real stupid question, and I'm not sure if this would be the
right place to ask this (if not a flame and redirect would be appreciated),
but I was wondering if it is possible for a private individual, to obtain
a bi-directional (uplink/downlink - earthstation - is this the terminology ?)
to the Internet via sattelite ?

Obviously I know nothing of the technology (if there is such a technology) so
any pointers would be greatly appreciated.

btw: Sorry if this is a FAQ, but I doubt that it is (seems like a relatively
nutzoid request to be a FAQ :-)

email: rgallen@muug.mb.ca mail: Expert Technology Corporation
QUICS: rgallen (613) 591-0934 34 Riverstone Rd.
Voice: (204) 339-8005 Winnipeg, Manitoba, Canada R2V 4B2
Fax: (204) 488-5943

313. APT-Satellites: Report NOV 06, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-08 08:47:47 UTC
From: peter.henne@gmd.de
Message-ID: <1993Nov8.084747.22496@gmd.de>
Source record: 28573
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, NOV 06, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 On
Meteor 3-3: APT 137.30 On

The northern hemisphere becomes more and more dim. No
IR-images from the Meteor's, Met 3-3 switches vis-APT on
over 70 deg NLat on its noon descending path, Met 2-21
starts vis-APT over 65 deg NLat on its morning descending
pass. The transmission is weak as always, but the signal
becomes better after passing the zenith and now seems to be
sightly better on passes west from the station.
NOAA-10 is off due to VHF-conflict with NOAA-12. All NOAA's
now transmit channels 3 and 4 over dark areas, channels
2 and 4 from illuminated parts of their orbits.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

314. Re: Sat access to Internet ?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-08 17:32:00 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Nov8.173200.11912@ke4zv.atl.ga.us>
Source record: 28575

In article <1993Nov8.063844.11523@muug.mb.ca> rgallen@muug.mb.ca (Rennie Allen) writes:
>This may be a real stupid question, and I'm not sure if this would be the
>right place to ask this (if not a flame and redirect would be appreciated),
>but I was wondering if it is possible for a private individual, to obtain
>a bi-directional (uplink/downlink - earthstation - is this the terminology ?)
>to the Internet via sattelite ?
>
>Obviously I know nothing of the technology (if there is such a technology) so
>any pointers would be greatly appreciated.

The answer is yes, but. :-)

What you're looking for is SCPC Vsat access. You can get it, but it's
not cheap. It's something like $15,000 plus per minute charges. There
was at one time a Usenet Netnews distribution via a subcarrier on one
of the TVsat channels, WGN I think. I don't know if it's still active.
To get it you needed a special decoder. It was one way only.

Gary
--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

315. * SpaceNews 08-Nov-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-11-08 18:08:48 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1108@ampr.org>
Source record: 28574
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1108
* SpaceNews 08-Nov-93 *

BID: $SPC1108

=========
SpaceNews
=========

MONDAY NOVEMBER 8, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* MARS OBSERVER NEWS *
======================
Paula Cleggett-Haleim
Headquarters, Washington, D.C. October 22, 1993

MARS OBSERVER INVESTIGATION BOARD STATUS REPORT

The Mars Observer Investigation Board held its third set of meetings, Wednesday through Friday, October 20-22, in Washington, D.C.

Since the last set of board meetings, technical teams conducted reviews of specific Mars Observer subsystems at the Jet Propulsion Laboratory, Pasadena, California, and Martin Marietta Aerospace, East Windsor, New Jersey.

Plausible scenarios for what could have caused the loss of communication with the Mars Observer spacecraft are still being developed and technically challenged.

The board previously had recommended a program to attempt to activate the Balloon Relay Experiment, an instrument onboard Mars Observer. After several attempts to activate the experiment, ground station engineers did not detect any return signals. The NASA Deep Space Network stationed at Goldstone, California, and the Jodrell Bank Observatory, United Kingdom, were used. Non-activation of the Balloon Relay Experiment leads the board to conclude that a Mars Observer failure scenario involving only the spacecraft downlink portion of the telecommunications system is highly unlikely.

In the coming weeks, the board will evaluate results of hardware and software tests, and in some cases, computer simulations of various spacecraft subsystems.

Late November is still the target timeframe for delivering a final report to the NASA Administrator, who will make the report publicly available.

[Info via NASA]

* STS-58 FAREWELL MESSAGE *
==========
The following packet radio beacon from Space Shuttle Columbia was received
by Dave, N6JLH in Northern California on 31-Oct-93:

W5RRR-1>SAREX <UI>:
This is STS-58 SAREX Robot station W5RRR-1
onboard the Space Shuttle Columbia.

W5RRR-1>QST <UI>:
73s from Columbia on our last day on orbit. We have a beautiful planet.
Thanks for participating in this mission with us.
The STS-58 Crew.

[Info via N6JLH]

* TEXAS BALLOON LAUNCH *
==========
The fifth flight of the North Texas Balloon Project will be on 13-Nov-93
at 08:30 CDT from a yet to be decided launch point south of Fort Worth,
Texas.

On board for this flight will be a cross band voice repeater with an uplink
on 445.800 MHz, and a downlink on 147.580 MHz. Also on board will be a GPS
satellite receiver linked to a packet transmitter. This will allow ground
stations to 'see' where and how high the payload is. The packet telemetry
downlink will be on 144.290 MHz, and ground stations may also digipeat
through this beacon using an uplink frequency of 145.890 MHz. The callsign
for the digipeater is W5SJZ-6.

A launch net will be conducted on 7155 KHz starting about 60 minutes or so
prior to launch. A local net will be conducted on 146.760 MHz for those in
the Fort Worth, Texas area. Net Control callsign will be W5SJZ (Lockheed
Amateur Radio Club)

Reception reports are welcomed. Please contact the mission coordinators on
the HF or VHF nets. QSL cards will be available for all who send in
accurate reception reports on the high altitude balloon payload.

Questions regarding this mission should be directed to:

Ed, N5PQR @ N5AUX.#DFW.TX.USA.NOAM.

[Info via N5PQR]

* OSCAR-13 NEWS *
==========
*** AO-13 TRANSPONDER SCHEDULE *** 1993 Oct 25-Nov 15
Mode-B : MA 0 to MA 130 !
Mode-BS : MA 130 to MA 180 !
Mode-S : MA 180 to MA 205 !<- S transponder; B trsp. is OFF
Mode-S : MA 205 to MA 210 !<- S beacon only
Mode-BS : MA 210 to MA 226 ! Alon/Alat 210/0

Omnis : MA 240 to MA 80 ! Move to attitude 240/0, Nov 15
Please don't uplink to B, MA 180-205. Interferes with mode S.

*** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 220 ! \ minutes.
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 226 ! Alon/Alat 240/0
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
Please don't uplink to B, MA 220-230. Interferes with mode S.

[Info via G3RUH]

* THANKS! *
===========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

IW1CXZ VU2LBW K3GLK N4TYS AA6TA

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

316. UHF All-mode Rig Wanted

Newsgroup: rec.radio.amateur.space
Date: 1993-11-08 19:19:26 UTC
From: prvalko@vela.acs.oakland.edu
Message-ID: <2bm63u$kmf@oak.oakland.edu>
Source record: 28576

Hello!

Do you have a UHF all mode rig that is just gathering dust? Turn it
into cash, sell it to me :-)

I have a TS-700SP and am looking for a suitable UHF rig to get on the
satelites and do some tropo work.

thanks and 73 =paul= wb8zjl (313)974-8324

317. Software recomm. for FT-736R operation

Newsgroup: rec.radio.amateur.space
Date: 1993-11-09 20:06:23 UTC
From: P06288@email.mot.com
Message-ID: <1993Nov9.200623.19694@schbbs.mot.com>
Source record: 28577

I am looking for recommendations by name, with pros and cons, for various software packages that any of you may have used with a FT-736R for sattelite work.

Please respond via E-Mail at the above address.

Thanks-

318. Fixed antennas for satellite work.

Newsgroup: rec.radio.amateur.space
Date: 1993-11-10 13:52:51 UTC
From: Harvey=P.=Sattin@nectech.COM
Message-ID: <9311101427.AA02810@nectech.com>
Source record: 28579

What, if any, fixed antennas would work best for satellite work?
I'm interested in working some of the 2-meter/440 stuff.

73
Harvey, N1PHP
hsattin@nectech.com

319. SPACE TRIVIA LIST - returns!

Newsgroup: rec.radio.amateur.space
Date: 1993-11-10 13:56:52 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Nov10.135652.14673@scorch.apana.org.au>
Source record: 28578
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

The SPACE TRIVIA LIST is now about to continue, after a few months of silence due to local commitments. If anyone has any further items of trivia that they would like to add, PLEASE SEND IT because we use all the Trivia that we get.

There are some 270 items at the moment, and the next source of items will be the Guiness Book of Records, which should yield quite a number of bits of Trivia since there are two sections devoted to facts about SPACE in general.

If anyone can make any recommendations about books with items of trivia, then please forward details.

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

320. Re: Sat access to Internet ?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-10 19:28:32 UTC
From: rgallen@muug.mb.ca
Message-ID: <1993Nov10.192832.18480@muug.mb.ca>
Source record: 28580

In <1993Nov8.173200.11912@ke4zv.atl.ga.us> gary@ke4zv.atl.ga.us (Gary Coffman) writes:

>In article <1993Nov8.063844.11523@muug.mb.ca> rgallen@muug.mb.ca (Rennie Allen) writes:
>>This may be a real stupid question, and I'm not sure if this would be the
>>right place to ask this (if not a flame and redirect would be appreciated),
>>but I was wondering if it is possible for a private individual, to obtain
>>a bi-directional (uplink/downlink - earthstation - is this the terminology ?)
>>to the Internet via sattelite ?
>>
>>Obviously I know nothing of the technology (if there is such a technology) so
>>any pointers would be greatly appreciated.

>The answer is yes, but. :-)

>What you're looking for is SCPC Vsat access. You can get it, but it's
>not cheap. It's something like $15,000 plus per minute charges. There
>was at one time a Usenet Netnews distribution via a subcarrier on one
>of the TVsat channels, WGN I think. I don't know if it's still active.
>To get it you needed a special decoder. It was one way only.

Hmmm $15K/minute sounds a little pricey :-), what kind of bandwidth are we
talking ? Isn't there any fractional bandwidth available for less ?

Does this mean when I ftp to some site in Japan (I know I'm using satellite
cuz the traceroute shows a 2000 ms delay between west coast US and JP), that
it's costing someone $15K/minute for the 1.6KB/sec bandwidth that I'm using ?

email: rgallen@muug.mb.ca mail: Expert Technology Corporation
QUICS: rgallen (613) 591-0934 34 Riverstone Rd.
Voice: (204) 339-8005 Winnipeg, Manitoba, Canada R2V 4B2
Fax: (204) 488-5943

321. Re: Sat access to Internet ?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-11 04:14:55 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Nov11.041455.26244@ke4zv.atl.ga.us>
Source record: 28581

In article <1993Nov10.192832.18480@muug.mb.ca> rgallen@muug.mb.ca (Rennie Allen) writes:
>In <1993Nov8.173200.11912@ke4zv.atl.ga.us> gary@ke4zv.atl.ga.us (Gary Coffman) writes:
>
>>In article <1993Nov8.063844.11523@muug.mb.ca> rgallen@muug.mb.ca (Rennie Allen) writes:
>>>This may be a real stupid question, and I'm not sure if this would be the
>>>right place to ask this (if not a flame and redirect would be appreciated),
>>>but I was wondering if it is possible for a private individual, to obtain
>>>a bi-directional (uplink/downlink - earthstation - is this the terminology ?)
>>>to the Internet via sattelite ?
>>>
>>>Obviously I know nothing of the technology (if there is such a technology) so
>>>any pointers would be greatly appreciated.
>
>>The answer is yes, but. :-)
>
>>What you're looking for is SCPC Vsat access. You can get it, but it's
>>not cheap. It's something like $15,000 plus per minute charges. There
>>was at one time a Usenet Netnews distribution via a subcarrier on one
>>of the TVsat channels, WGN I think. I don't know if it's still active.
>>To get it you needed a special decoder. It was one way only.
>
>Hmmm $15K/minute sounds a little pricey :-), what kind of bandwidth are we
>talking ? Isn't there any fractional bandwidth available for less ?
>
>Does this mean when I ftp to some site in Japan (I know I'm using satellite
>cuz the traceroute shows a 2000 ms delay between west coast US and JP), that
>it's costing someone $15K/minute for the 1.6KB/sec bandwidth that I'm using ?

No, there's a $15,000 *one time* charge, then there are per minute
charges. That $15,000 is approximate, you can get better deals.

Gary

--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

322. Re: Fixed antennas for satellite work.

Newsgroup: rec.radio.amateur.space
Date: 1993-11-11 08:46:06 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Nov11.084606.28160@ke4zv.atl.ga.us>
Source record: 28582

In article <9311101427.AA02810@nectech.com> Harvey=P.=Sattin@nectech.COM writes:
>What, if any, fixed antennas would work best for satellite work?
>I'm interested in working some of the 2-meter/440 stuff.

Just about any dual band vertical will work. The copper cactus
dual band J-pole in the Handbook does OK. These won't do for
Oscar 10 or 13, but they're fine for the microsats. If you want
to get fancier, a Lindenblad would be better. It's an omni-directional
circular polarized antenna. The Satellite Experimenter's Handbook
has a design.

Of course steerable beams with automatic computer tracking are
best, but if you can't do that, an omni will do for the low
orbit birds.

Gary

--
Gary Coffman KE4ZV |"If 10% is good enough | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | for Jesus, it's good | uunet!rsiatl!ke4zv!gary
534 Shannon Way | enough for Uncle Sam."| emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -Ray Stevens |

323. Help on micro satellite project wanted!

Newsgroup: rec.radio.amateur.space
Date: 1993-11-11 11:32:52 UTC
From: svm@lise.physik.tu-berlin.de
Message-ID: <2bt7t4$ljk@mailgzrz.TU-Berlin.DE>
Source record: 28583

HELP WANTED ON SATELLITE DESIGN PROJECT

We are a group of five students at the Technical University of Berlin, Department of Aeronautics and Astronautics. This winter term we have to conduct a study for our satellite design class in which we have to examine if it is feasible and affordable to construct a micro satellite that is able to survey geostationary satellites for possible damage.

Since our teaching staff provides us only very few facts, we would like to ask for your assistance. Please mail us all your suggestions for possible technical solutions and all information you can provide on rockets and satellite subsystems.

First, we have to develop the mission that our satellite has to fulfill. What should be the abilities of a satellite that can fulfill the mission further described below?

Second, to design a satellite that is able to fulfill the specified mission we need information of all kinds: about the launcher and the satellite subsystems.

Please mail your replies to:

svm@marie.physik.tu-berlin.de or nasacafe@w250zrz.zrz.tu-berlin.de

Project:

- to design a micro satellite that is able to survey geostationary satellites for possible damages or other problems (e.g. blocked solar arrays)
- Mass : below 100 kilogramms
- Max. size: a cube of one meter of length, depending on the space available on the instrument platform of the GOMS satellite
- Launch: as a secondary payload with a Russian GOMS meteorology satellite, attached to the instrument platform, released in orbit, launched with a Proton rocket
- Task: to provide pictures of geostationary satellites, resolution should be large enough to see small parts (e.g. a bolt), closest distance to the target: 50 - 100 meters
- Propulsion: cold gas, no north-south station keeping
- Ground segment: 10 meter parabolic antenna near Berlin, Germany
- Communications: Telemetry, Tracking and Command in the 2 meter band (ca. 140 - 150 Megahertz), picture transmission in the L-Band

Needed information:

- Proton rocket: payload, launch stresses (acceleration, vibrations, costs)
- GOMS satellite : mass, available room on instrument platform
- all available information on CCD chips, lenses (especially storage and protection during launch)
- cold gas systems
- image processing, data storage, data transmission
- possible materials for light weight construction
- literature?

For all of you, who are interested in micro satellite technology:
TUBSAT-B, the second Technical University of Berlin SATellite is scheduled to be launched on November 27 1993 as a secondary payload with a Russian Meteor satellite. TUBSAT-A, launched in 1991, is still operative, but the capacity of the Ni-Cd batteries has dropped to one half of the original value.

Thanks for your help.

Bye.

Sven, Carsten, Uwe, Ralf and Rene.
--
****
* Sven Muencheberg svm@marie.physik.tu-berlin.de *
* Technical University Berlin Division of Astronautics *
* Berlin, Germany *
* _____ *
* Groucho : You know I think you are the most beautiful woman in the whole *
* world ? *
* Beatrice : Do you really ? *
* Groucho : No. But I don't mind lying if it will get me somewheres. *
****

324. Re: Fixed antennas for satellite work.

Newsgroup: rec.radio.amateur.space
Date: 1993-11-11 12:37:37 UTC
From: mac20@namaste.cc.columbia.edu
Message-ID: <2btbmh$fjc@apakabar.cc.columbia.edu>
Source record: 28584

Speaking of computer-controlled sat tracking;
is there a standard for the interface?
and what' the best way to go about it?
How's the handbook project?
I'm thinking IBM-PC mainly but RS-232 would of course be more generally
useful I suppose.

(been meaning to attack this for years, maybe someday i'll actually get off
my can....)

Mike Cecere
KF2NV
Columbia Univeristy
Applied Physics Department

325. * SpaceNews 15-Nov-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-11-12 14:34:36 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1115@ampr.org>
Source record: 28587
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1115
* SpaceNews 15-Nov-93 *

BID: $SPC1115

=========
SpaceNews
=========

MONDAY NOVEMBER 15, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* DOVE RECOVERY BEGUN *
======================
The following is by Jim White, WD0E:

DOVE is up and running on 2 meters. It is sending normal ASCII telemetry and short text bulletins on 145.825. A very quick look at telemetry indicates the s/c is basically healthy.

The team of Bob Diersing, N5HAD, Bill McCaa, K0RZ, and myself have been working very intensively for about 10 days to create and test new software that allowed automated software loading via two meters in a half duplex mode. This replaces the 'ear-ack on s-band' method N4HY had used in the past that was so difficult as to be a barrier to recovery.

We would like to have telemetry reports. Please send them to vk7zbx@KO-23, @ AO-16 or on internet vk7zbx@amsat.org or to me wd0e@amsat.org, or CI$ 71477,546. The most recent version of TLMDCII (3-8-92) will decode and record DOVE telemetry very nicely.

After we are sure the satellite is stable in this configuration and the power targets are established, the next step will be to load up through PHTX and test the voice module. Depending on the condition of the s/c and other issue, this could take several weeks.

It'd like to express sincere thanks to Bob Diersing for all of his hard work creating a RAM loader, and Bill McCaa for the many passes of s-band and two meter receive he provided (often late into the night). It could not have been done without their enthusiastic efforts.

Thanks also to Harold Price, NK6K, for providing the development system hardware, software, and a good deal of coaching. His contribution was invaluable.

Given a reasonably healthy s/c, I'm confident we can make DOVE talk as I described at the AMSAT-NA Space Symposium in Dallas a few weeks ago.

Jim White
wd0e@amsat.org

[Story via PACSAT-OSCAR-16]

* PACSAT-OSCAR-16 STATUS *
==========
PACSAT-1>AMSAT <UI>:
02 November 1993
Monthly WOD collection by week
1) Array currents 2)Temperatures 3)Bus/Battery
AO16 Command Team <WJ9F>

* WEBERSAT-OSCAR-18 NEWS *
==========
WEBER-1>CAST <UI>:

06-NOV-93

*Collecting and Sending WOD

Week4: Temps & Impact Ch# 14 2F 30 35 3B 40

*New Images

*Monday, New Spectrum

I3/EA2CLS

* LUSAT-OSCAR-19 STATUS *
==========
LUSAT-1>AMARG <UI>:

October 16.

BBS is open.
Directory Broadcast feature is available.
Use PB version 920430p.
Enjoy!.

LU8DYF, LO-19 command station.

* OSCAR 20 SCHEDULE CHANGE *
==========
Effective December 1, 1993, the Fuji-OSCAR 20 satellite will change its digital/analog operating schedule. At present, the satellite functions as a packet BBS every day except Wednesday when it switches to the analog transponder (CW/SSB) mode for approximately 24 hours.

Beginning December 1, at 0843 UTC, OSCAR 20 will be switched to the analog mode (Mode JA) where it will remain for one week. On December 11, at 07:51 UTC, it will be switched back to the digital BBS mode (Mode JD) for one week. The modes will continus to alternate on a weekly basis until further notice.

The December operating schedule is as follows:

Mode JA-Analog : 01-Dec-93 at 08:43 UTC through 08-Dec-93 at 07:16 UTC
Mode JD-Digital: 08-Dec-93 at 07:16 UTC through 15-Dec-93 at 07:41 UTC
Mode JA-Analog : 15-Dec-93 at 07:41 UTC through 22-Dec-93 at 08:05 UTC
Mode JD-Digital: 22-Dec-93 at 08:05 UTC through 29-Dec-93 at 08:30 UTC (+/-)

OSCAR 20 Frequencies:

Digital Uplink : 145.850, 145.870, 145.890, 145.910 MHz
Digital Downlink: 435.910 MHz

Analog Uplink : 145.900 to 146.000 MHz
Analog Downlink : 435.800 to 435.900 MHz

The analog transponder inverts uplinked signals. LSB on the uplink becomes USB on the downlink. A signal in the lower portion of the uplink passband appears in the upper portion of the downlink passband.

The decision to change the schedule was made by Toshiyuki Kondoh, JR1NVU, who is in charge of FO-20 operations. By providing a full week of analog transponder time, the OSCAR 20 command team hopes to encourage more hams to use this mode.

The Japan Amateur Radio League offers a "Fuji Award" to any amateur making at least 10 contacts via OSCAR-20 Mode JA. More details on this award will be relayed as they become available from the JARL.

[Info from Fujio Yamashita, JS1UKR, via W1AW and the ARRL]

* AMSAT-OSCAR-21 STATUS *
==========
RUDAK2>BEACON <UI C>:
++ Hi, this is the RUDAK-II experiment on AMSAT OSCAR 21 ++

RUDAK2>BEACON <UI C>:
***** New Modes ahead *****
* The current schedule is about to change *
* soon. New TX modes will be installed. *
* Stay tuned! 73 de RUDAK-Team *

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

N3NCS ZS5FR AA6CK G6YPK NF6H F9ZY

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

326. WA2AGE calling AA7A

Newsgroup: rec.radio.amateur.space
Date: 1993-11-12 19:03:37 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7675@gold.gvg.tek.com>
Source record: 28585

Ed,

Please contact me about your HRPT weather satellite station.

Sorry about the wide area posting, but RS10 went over the horizon before
we were able to exchange email addresses!!

Thanks,
Randy
WA2AGE

randyh@gvgadg.gvg.tek.com
wa2age@amsat.org

327. Two-Line Orbital Element Sets (TLE292)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-13 03:16:53 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.753160613@afit.af.mil>
Source record: 28586
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #292 -
Alouette 1
1 00424U 62049 93314.04817618 .00000047 00000-0 51139-4 0 9125
2 00424 80.4656 141.2145 0023171 320.7622 39.1839 13.67786723552448
ATS 3
1 03029U 67111A 93307.12284649 -.00000076 00000-0 10000-3 0 1088
2 03029 14.4925 9.7850 0011665 256.8377 74.6222 1.00272955 95162
Cosmos 398
1 04966U 71016A 93315.77291184 .00091306 33052-4 23265-3 0 7838
2 04966 51.4502 72.6930 1238484 103.0634 271.1162 13.38421516743084
Starlette
1 07646U 75010A 93309.81247243 -.00000051 00000-0 76835-5 0 7091
2 07646 49.8290 314.8230 0205766 318.4571 40.0836 13.82184495946952
LAGEOS
1 08820U 76039A 93313.40795454 -.00000001 00000-0 10000-3 0 9121
2 08820 109.8564 60.3015 0044189 332.0097 27.8121 6.38664502153110
ETS-2
1 09852U 77014A 93315.64518670 .00000115 00000-0 10000-3 0 9082
2 09852 11.7646 44.1098 0000417 69.1689 7.9235 1.00014189 8488
GOES 2
1 10061U 77048A 93315.57270314 .00000111 00000-0 10000-3 0 2174
2 10061 10.7904 48.3781 0002653 36.0612 36.6197 1.00265818 4935
IUE
1 10637U 78012A 93314.27788439 -.00000171 00000-0 00000+0 0 9127
2 10637 34.2628 98.4614 1307890 29.3752 331.8558 1.00273414 10525
GPS BI-01
1 10684U 78020A 93311.09083195 -.00000013 00000-0 10000-3 0 2068
2 10684 64.5250 52.1204 0063965 162.2632 197.9641 1.98069643100530
GPS BI-02
1 10893U 78047A 93314.03739719 -.00000011 00000-0 10000-3 0 2064
```

```
2 10893 63.6580 291.4309 0209954 13.5284 347.0526 2.01627507113643
GOES 3
1 10953U 78062A 93310.53258443 .00000115 00000-0 10000-3 0 2120
2 10953 9.7177 51.2655 0005549 90.7174 282.0818 1.00294861 9498
SeaSat 1
1 10967U 78064A 93313.91026467 .00000103 00000-0 55243-4 0 2116
2 10967 108.0084 8.4170 0002818 258.2993 101.7833 14.37888107804836
GPS BI-03
1 11054U 78093A 93311.54815708 -.00000009 00000-0 10000-3 0 1078
2 11054 63.3465 288.2824 0043136 175.1610 184.8958 1.93505629110210
Nimbus 7
1 11080U 78098A 93314.72647710 .00000028 00000-0 40396-4 0 3165
2 11080 99.0812 201.1567 0009473 3.7215 356.4009 13.83723323759861
GPS BI-04
1 11141U 78112A 93314.07012389 -.00000017 00000-0 10000-3 0 8089
2 11141 64.5087 52.8979 0048126 24.8140 335.4185 1.92894849108765
GPS BI-05
1 11690U 80011A 93314.51689011 -.00000016 00000-0 10000-3 0 7099
2 11690 64.8754 53.8816 0142139 198.5251 160.9486 2.00552463115159
GPS BI-06
1 11783U 80032A 93307.39599641 -.00000011 00000-0 10000-3 0 9099
2 11783 62.7984 285.8109 0205062 29.1708 331.9589 2.03456878 99361
GOES 5
1 12472U 81049A 93315.19588281 .00000120 00000-0 10000-3 0 7064
2 12472 6.3726 60.5681 0003709 5.2428 279.4625 1.00235308 3570
Cosmos 1383
1 13301U 82066A 93313.83761415 .00000042 00000-0 42809-4 0 2114
2 13301 82.9295 110.5880 0027898 342.0260 17.9901 13.68046314567437
LandSat 4
1 13367U 82072A 93314.28185441 .00000205 00000-0 50609-4 0 3818
2 13367 98.2127 11.3968 0006316 207.2787 152.8080 14.57113407602182
IRAS
1 13777U 83004A 93313.52607241 .00000079 00000-0 66576-4 0 5116
2 13777 98.9769 143.9869 0012432 197.7114 162.3619 13.99178881220510
Cosmos 1447
1 13916U 83021A 93313.68757347 .00000053 00000-0 49304-4 0 3110
2 13916 82.9476 174.0345 0037139 282.9122 76.7886 13.74297865533185
TDRS 1
1 13969U 83026B 93309.26068598 .00000127 00000-0 10000-3 0 2206
2 13969 7.2635 53.4115 0000453 357.0821 277.1818 1.00278770 11806
GOES 6
1 14050U 83041A 93307.18652730 -.00000211 00000-0 10000-3 0 1126
2 14050 5.1401 63.5198 0001758 302.8468 25.9314 1.00251135 10516
OSCAR 10
1 14129U 83058B 93311.38149902 .00000031 00000-0 10000-3 0 2096
2 14129 27.1767 357.3744 6018380 128.2574 302.7497 2.05879051 50236
LandSat 5
1 14780U 84021A 93314.18344288 .00000195 00000-0 48282-4 0 9794
2 14780 98.1966 12.9420 0003735 212.5641 147.5327 14.57123059515588
UoSat 2
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1 14781U 84021B 93313.58249069 .00000229 00000-0 42927-4 0 6110
2 14781 97.7981 333.4777 0010810 254.3694 105.6328 14.69080500518069
GPS BI-09
1 15039U 84059A 93313.35022856 -.00000018 00000-0 10000-3 0 1147
2 15039 63.8362 47.9392 0054966 217.2531 142.3817 2.00561794 68928
Cosmos 1574
1 15055U 84062A 93313.81629772 .00000076 00000-0 74585-4 0 5113
2 15055 82.9555 226.8015 0028165 104.3091 256.1194 13.73594966470514
GPS BI-10
1 15271U 84097A 93313.28240698 -.00000011 00000-0 10000-3 0 7177
2 15271 62.4836 285.5051 0139648 345.5157 14.0795 2.00574628 66040
Cosmos 1602
1 15331U 84105A 93313.94470606 .00000584 00000-0 68223-4 0 2104
2 15331 82.5316 282.9644 0018640 204.5923 155.4423 14.84177429491992
NOAA 9
1 15427U 84123A 93314.52913873 .00000147 00000-0 87982-4 0 6116
2 15427 99.0857 357.1120 0015410 113.5483 246.7303 14.13561054459456
GPS BI-11
1 16129U 85093A 93315.01265900 -.00000019 00000-0 10000-3 0 5124
2 16129 64.5913 49.9073 0131803 141.6648 219.2891 2.00563825 5780
Mir
1 16609U 86017A 93316.06006811 .00009167 00000-0 11927-3 0 5765
2 16609 51.6198 196.5680 0005714 30.0876 329.8333 15.59559189442154
SPOT 1
1 16613U 86019A 93314.22100915 .00000114 00000-0 62356-4 0 5742
2 16613 98.7177 26.5166 0000965 40.5653 319.5595 14.20043127 85483
Cosmos 1766
1 16881U 86055A 93314.32841706 .00000495 00000-0 59054-4 0 1109
2 16881 82.5205 340.7262 0017840 227.3721 132.5970 14.83213950393004
EGP
1 16908U 86061A 93313.58023789 -.00000025 00000-0 10000-3 0 8100
2 16908 50.0080 39.5489 0011594 114.7195 245.4844 12.44408460329429
NOAA 10
1 16969U 86073A 93315.75032400 .00000081 00000-0 42765-4 0 5091
2 16969 98.5140 326.3695 0012248 244.0314 115.9574 14.24842726371642
MOS-1
1 17527U 87018A 93315.78892016 .00000134 00000-0 12493-3 0 9741
2 17527 99.0610 23.7619 0001276 111.3680 248.7228 13.94889807342620
GOES 7
1 17561U 87022A 93314.43242560 -.00000017 00000-0 10000-3 0 6197
2 17561 1.0701 78.2785 0002131 352.6265 22.5616 1.00270262 7788
Kvant-1
1 17845U 87030A 93315.03485207 .00010309 00000-0 13343-3 0 6316
2 17845 51.6184 201.7248 0005545 23.6260 336.4987 15.59537803442022
DMSP B5D2-3
1 18123U 87053A 93311.95091885 .00000078 00000-0 49694-4 0 1162
2 18123 98.7880 141.8667 0015157 90.5299 269.7613 14.15315928329718
RS-10/11
1 18129U 87054A 93314.04939054 .00000017 00000-0 11670-4 0 8119
2 18129 82.9214 130.8225 0010360 275.4234 84.5738 13.72325356319844
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Meteor 2-16
1 18312U 87068A 93314.46921332 .00000139 00000-0 11497-3 0 2119
2 18312 82.5573 25.3280 0013407 11.1730 348.9798 13.84013027314796
Meteor 2-17
1 18820U 88005A 93313.86326152 .00000060 00000-0 48384-4 0 2105
2 18820 82.5401 83.0499 0017920 77.7053 282.6113 13.84696783292003
DMSP B5D2-4
1 18822U 88006A 93312.61698435 .00000156 00000-0 77396-4 0 2196
2 18822 98.4664 171.3707 0005571 273.3238 86.7306 14.22895308299150
Glonass 34
1 19163U 88043A 93315.21435071 .00000032 00000-0 10000-3 0 8096
2 19163 64.9945 117.7536 0006614 156.9603 203.1580 2.13102861 42016
Glonass 36
1 19165U 88043C 93311.51598025 .00000030 00000-0 10000-3 0 2065
2 19165 64.9676 117.8498 0003540 345.7865 14.2269 2.13102334 42548
METEOSAT 3
1 19215U 88051A 93314.08215613 -.00000225 00000-0 10000-3 0 8113
2 19215 1.2543 73.1590 0003578 222.7752 69.0015 1.00270571 7708
AO-13
1 19216U 88051B 93313.91272759 -.00000211 00000-0 10000-4 0 8126
2 19216 57.8912 284.9332 7213964 328.0558 3.5561 2.09724845 9917
OKEAN 1
1 19274U 88056A 93313.85331610 .00000502 00000-0 61567-4 0 8104
2 19274 82.5123 80.8340 0021051 15.3190 344.8659 14.81998644288592
Meteor 3-2
1 19336U 88064A 93313.98312645 .00000043 00000-0 10000-3 0 2102
2 19336 82.5385 118.8020 0017396 88.4059 271.9055 13.16962219254409
Glonass 39
1 19503U 88085C 93315.29469574 -.00000017 00000-0 10000-3 0 1078
2 19503 65.7431 356.6602 0007060 177.7328 182.3597 2.13101914 40115
NOAA 11
1 19531U 88089A 93315.67695101 .00000165 00000-0 99084-4 0 4090
2 19531 99.1508 294.5292 0012515 27.3413 332.8509 14.12931327264500
TDRS 2
1 19548U 88091B 93315.22737227 -.00000254 00000-0 10000-3 0 8160
2 19548 0.5292 79.1575 0003409 139.9295 211.3514 1.00276339 6021
Glonass 40
1 19749U 89001A 93315.33459552 .00000031 00000-0 10000-3 0 3100
2 19749 64.9253 117.3412 0004668 259.5712 100.3963 2.13101901 37645
Glonass 41
1 19750U 89001B 93314.45299314 .00000032 00000-0 10000-3 0 2067
2 19750 64.9511 117.4153 0006060 245.1435 114.8170 2.13101871 37633
GPS BII-01
1 19802U 89013A 93313.85560029 .00000034 00000-0 10000-3 0 8119
2 19802 55.0747 148.4074 0035905 173.3112 186.8084 2.00567281 34641
Akebono
1 19822U 89016A 93314.53524350 .00006828 00000-0 40338-3 0 1248
2 19822 75.0864 305.2719 3846356 90.6172 312.5593 7.72378458 92337
Meteor 2-18
1 19851U 89018A 93314.44174536 .00000042 00000-0 31952-4 0 2111
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2 19851 82.5186 318.3186 0015511 116.9458 243.3286 13.84348503237428
MOP-1
1 19876U 89020B 93314.89916795 .00000033 00000-0 10000-3 0 7127
2 19876 0.1375 324.1883 0002317 270.6211 139.4173 1.00289840 4947
TDRS 3
1 19883U 89021B 93312.04248656 -.00000236 00000-0 00000+0 0 8127
2 19883 0.0647 69.1358 0004730 259.3272 53.1265 1.00271089 87256
GPS BII-02
1 20061U 89044A 93315.19367428 -.00000024 00000-0 10000-3 0 8120
2 20061 54.7519 325.3551 0124928 205.1405 154.2724 2.00566019 32424
Nadezhda 1
1 20103U 89050A 93313.86315045 .00000051 00000-0 48245-4 0 9127
2 20103 82.9574 89.5034 0036775 179.4220 180.6991 13.73828167218196
GPS BII-03
1 20185U 89064A 93315.02958857 .00000035 00000-0 10000-3 0 8157
2 20185 54.9039 149.0166 0006348 226.6475 133.3582 2.00552398 30987
GMS 4
1 20217U 89070A 93315.25496854 -.00000251 00000-0 10000-3 0 9162
2 20217 0.0164 120.8201 0000127 287.5643 234.1414 1.00270264 15900
GPS BII-04
1 20302U 89085A 93315.06288444 -.00000020 00000-0 10000-3 0 8169
2 20302 53.7084 265.8407 0005986 310.1254 49.8086 2.00561139 29780
Meteor 3-3
1 20305U 89086A 93313.78275180 .00000043 00000-0 10000-3 0 9124
2 20305 82.5475 62.1477 0016698 110.3082 249.9836 13.16023732194255
COBE
1 20322U 89089A 93305.56485476 -.00000165 00000-0 -94076-4 0 9093
2 20322 98.9828 319.5667 0008293 182.3552 177.7580 14.03416732202460
Kvant-2
1 20335U 89093A 93315.03485207 .00010309 00000-0 13343-3 0 7305
2 20335 51.6184 201.7248 0005545 23.6260 336.4987 15.59537803442031
GPS BII-05
1 20361U 89097A 93312.57641196 .00000009 00000-0 10000-3 0 7139
2 20361 55.4023 91.0699 0071960 102.6023 258.2002 2.00567065 19228
SPOT 2
1 20436U 90005A 93316.02133861 .00000120 00000-0 65161-4 0 6808
2 20436 98.6914 28.5842 0001517 96.0960 263.9996 14.20041427197272
UO-14
1 20437U 90005B 93314.26240544 .00000128 00000-0 57654-4 0 9113
2 20437 98.6068 36.8706 0011455 111.4215 248.8190 14.29802927198303
UO-15
1 20438U 90005C 93314.23744774 .00000059 00000-0 30931-4 0 7115
2 20438 98.6080 36.0548 0010680 113.7003 246.5301 14.29149819198238
PACSAT
1 20439U 90005D 93314.25650448 .00000093 00000-0 43829-4 0 7110
2 20439 98.6135 37.8762 0011873 112.5374 247.7066 14.29859897198314
DO-17
1 20440U 90005E 93314.72182474 .00000108 00000-0 49637-4 0 7113
2 20440 98.6156 38.5937 0011919 110.1078 250.1390 14.29997154198392
WO-18
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1 20441U 90005F 93314.27363549 .00000092 00000-0 43527-4 0 7123
2 20441 98.6152 38.1661 0012426 111.7995 248.4510 14.29974899198337
LO-19
1 20442U 90005G 93314.26623889 .00000107 00000-0 48991-4 0 7115
2 20442 98.6160 38.3657 0012902 111.6029 248.6529 14.30067157198345
GPS BII-06
1 20452U 90008A 93314.47829828 .00000007 00000-0 10000-3 0 8134
2 20452 54.0785 205.4186 0052771 70.4868 290.1614 2.00564233 27754
MOS-1B
1 20478U 90013A 93313.25197600 .00000117 00000-0 10000-3 0 5172
2 20478 99.0643 25.3914 0000930 345.4308 14.6826 13.94902057111984
DEBUT
1 20479U 90013B 93314.00910226 .00000006 00000-0 38239-4 0 7088
2 20479 99.0229 142.5635 0541012 115.9650 249.8209 12.83309545176021
FO-20
1 20480U 90013C 93305.55138133 -.00000003 00000-0 19656-4 0 6066
2 20480 99.0216 135.6374 0540941 135.2941 229.3106 12.83221774174934
MOS-1B R/B
1 20491U 90013D 93314.61157411 .00000718 00000-0 13986-2 0 9114
2 20491 99.0434 181.8199 0470550 0.2287 359.8957 13.02992198178190
LACE
1 20496U 90015A 93316.00221506 .00003283 00000-0 11404-3 0 3144
2 20496 43.1007 202.3411 0012296 36.6760 323.4616 15.31621006208199
Nadezhda 2
1 20508U 90017A 93313.81893584 .00000040 00000-0 36542-4 0 9119
2 20508 82.9570 224.2011 0045201 129.3384 231.1790 13.73462411185438
OKEAN 2
1 20510U 90018A 93314.27869302 .00000410 00000-0 54954-4 0 2116
2 20510 82.5252 28.1295 0018179 180.8593 179.2580 14.78176072199319
INTELSAT-6
1 20523U 90021A 93313.20384037 -.00000211 00000-0 20000-3 0 3141
2 20523 0.0083 316.1928 0000919 273.2051 217.8921 1.00269367 6408
GPS BII-07
1 20533U 90025A 93312.39126525 -.00000023 00000-0 10000-3 0 8113
2 20533 55.1007 325.9169 0040105 85.3694 275.1288 2.00562634 26484
PegSat
1 20546U 90028A 93314.83187536 .00007533 00000-0 19670-3 0 5188
2 20546 94.1152 175.4503 0083751 49.6371 311.1844 15.35260360198719
HST
1 20580U 90037B 93313.50274220 .00001017 00000-0 88525-4 0 3619
2 20580 28.4689 207.6164 0004751 130.5889 229.5111 14.92913523193251
MACSAT 2
1 20608U 90043B 93314.16648043 .00000372 00000-0 62925-4 0 9118
2 20608 89.9264 181.5533 0107799 135.5607 225.4321 14.64586389187225
Glonass 44
1 20619U 90045A 93315.23489940 -.00000017 00000-0 00000+0 0 9354
2 20619 65.3453 356.3819 0026121 215.2309 144.6450 2.13103007 27106
Glonass 45
1 20620U 90045B 93315.35345265 -.00000017 00000-0 00000+0 0 9259
2 20620 65.3374 356.3741 0005241 29.7715 330.3360 2.13102622 27121
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Glonass 46
1 20621U 90045C 93314.94788209 -.00000017 00000-0 10000-3 0 6110
2 20621 65.3583 356.4457 0013312 202.1349 157.8514 2.13101231 27103
Kristall
1 20635U 90048A 93315.03485207 .00010309 00000-0 13343-3 0 5274
2 20635 51.6184 201.7248 0005545 23.6260 336.4987 15.59537803442034
ROSAT
1 20638U 90049A 93315.96167799 .00000759 00000-0 60346-4 0 2139
2 20638 52.9872 246.8832 0014156 127.8090 232.4096 15.06471812189325
Meteor 2-19
1 20670U 90057A 93314.71352062 .00000015 00000-0 79036-5 0 7110
2 20670 82.5501 22.0091 0017060 42.7604 317.4880 13.84180249170390
CRRES
1 20712U 90065A 93315.28904771 .00000470 00000-0 47165-3 0 7727
2 20712 17.9127 277.7829 7195610 24.5830 357.0849 2.34830199 20753
GPS BII-08
1 20724U 90068A 93315.20045064 .00000035 00000-0 10000-3 0 7125
2 20724 54.7146 146.7247 0108153 154.9279 205.6635 2.00562689 23965
Feng Yun1-2
1 20788U 90081A 93314.27490495 .00000352 00000-0 25587-3 0 8161
2 20788 98.8528 336.2622 0014224 264.8255 95.1288 14.01329924163048
Meteor 2-20
1 20826U 90086A 93314.40511387 .00000040 00000-0 31266-4 0 7107
2 20826 82.5262 320.0564 0012856 307.6374 52.3617 13.83563412157505
GPS BII-09
1 20830U 90088A 93313.25682980 .00000007 00000-0 10000-3 0 7121
2 20830 55.3335 89.0897 0068976 106.7148 254.0368 2.00556210 23007
GPS BIIA-10
1 20959U 90103A 93314.16325040 .00000034 00000-0 10000-3 0 6111
2 20959 54.9358 148.6263 0076643 222.4339 137.0348 2.00571923 21617
DMSP B5D2-5
1 20978U 90105A 93313.12554969 .00000239 00000-0 93368-4 0 3217
2 20978 98.7174 10.9550 0080271 91.5436 269.4947 14.32319024153605
Glonass 47
1 21006U 90110A 93315.44853518 .00000031 00000-0 00000+0 0 5404
2 21006 64.9032 116.7092 0060299 185.7491 174.1929 2.13102306 22782
Glonass 48
1 21007U 90110B 93313.75579322 .00000032 00000-0 00000+0 0 6306
2 21007 64.9297 116.8216 0037442 177.4076 182.6326 2.13101116 22767
Glonass 49
1 21008U 90110C 93314.11101158 .00000032 00000-0 00000+0 0 6272
2 21008 64.9071 116.7678 0007551 278.7175 81.2126 2.13098921 22752
INFORMTR-1
1 21087U 91006A 93314.29055835 .00000084 00000-0 82657-4 0 3674
2 21087 82.9398 304.7020 0035176 337.0887 22.8703 13.74528243139502
Cosmos 2123
1 21089U 91007A 93313.61484132 .00000056 00000-0 53208-4 0 6119
2 21089 82.9251 174.2800 0030580 1.6907 358.4344 13.74029689138495
MOP-2
1 21140U 91015B 93315.12481529 .00000021 00000-0 10000-3 0 6104
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2 21140 0.2947 44.4608 0000998 294.3332 116.3487 1.00262254 4804
Nadezhda 3
1 21152U 91019A 93314.09191992 .00000043 00000-0 38834-4 0 7109
2 21152 82.9254 129.4953 0042516 103.8949 256.6940 13.73489533133306
Glonass 50
1 21216U 91025A 93313.58946501 -.00000018 00000-0 10000-3 0 2072
2 21216 65.0905 356.2727 0011735 214.6916 145.2983 2.13103531 20268
Glonass 51
1 21217U 91025B 93314.12305135 -.00000018 00000-0 10000-3 0 5293
2 21217 65.0897 356.2705 0013126 238.2004 121.7376 2.13101821 20277
Glonass 52
1 21218U 91025C 93315.17683256 -.00000017 00000-0 10000-3 0 1096
2 21218 65.1036 356.2066 0013272 275.3395 84.5775 2.13098243 20295
GRO
1 21225U 91027B 93314.39830284 .00016953 00000-0 18182-3 0 2202
2 21225 28.4634 313.5049 0075239 9.9355 350.2723 15.58504747 23130
Meteor 3-4
1 21232U 91030A 93315.73024619 .00000043 00000-0 10000-3 0 6141
2 21232 82.5399 323.3320 0013389 14.0830 346.0795 13.16457561122732
NOAA 12
1 21263U 91032A 93315.68793624 .00000176 00000-0 87457-4 0 8162
2 21263 98.6427 343.0215 0013434 143.1680 217.0407 14.22331177129619
OKEAN 3
1 21397U 91039A 93314.07021654 .00000273 00000-0 37830-4 0 9110
2 21397 82.5234 299.5273 0021002 254.8311 105.0576 14.76051249131170
GPS BIIA-11
1 21552U 91047A 93313.43724443 .00000005 00000-0 10000-3 0 6150
2 21552 55.6419 86.6084 0052018 231.7796 127.7453 2.00573884 17194
ERS-1
1 21574U 91050A 93315.95908369 .00000136 00000-0 57986-4 0 3278
2 21574 98.5423 28.5969 0000938 84.6425 275.4916 14.32256998121557
UO-22
1 21575U 91050B 93313.78644466 .00000117 00000-0 46604-4 0 4111
2 21575 98.4598 27.4629 0006935 224.2634 135.7989 14.36863544121573
ORBCOMM-X
1 21576U 91050C 93314.74437126 .00000151 00000-0 58554-4 0 5118
2 21576 98.4573 27.4751 0003112 229.4907 130.6009 14.36250454121653
TUBSAT
1 21577U 91050D 93314.23292051 .00000096 00000-0 39635-4 0 4115
2 21577 98.4601 27.3687 0005604 224.3058 135.7681 14.36402930121607
SARA
1 21578U 91050E 93314.23733545 .00000624 00000-0 21753-3 0 6114
2 21578 98.4674 29.6305 0004170 225.1175 134.9674 14.38576313121721
TDRS 4
1 21639U 91054B 93314.28890846 .00000114 00000-0 00000+0 0 6188
2 21639 0.0597 67.6041 0000677 128.8081 142.7419 1.00273938 6384
Meteor 3-5
1 21655U 91056A 93313.85451209 .00000043 00000-0 10000-3 0 6115
2 21655 82.5506 271.6301 0014550 26.1377 334.0477 13.16825241107591
UARS
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1 21701U 91063B 93315.59270845 -.00001996 00000-0 -16511-3 0 4125
2 21701 56.9842 310.8939 0005642 92.8950 267.4094 14.96195848118366
DMSP B5D2-6
1 21798U 91082A 93313.20121301 .00000103 00000-0 64414-4 0 9724
2 21798 98.9598 313.5757 0013722 43.3634 316.8619 14.13729306100535
Glonass 53
1 21853U 92005A 93307.41232712 .00000028 00000-0 10000-3 0 8093
2 21853 64.8501 116.7146 0006581 192.8908 167.1090 2.13102663 13730
Glonass 54
1 21854U 92005B 93312.39776643 .00000031 00000-0 00000+0 0 8317
2 21854 64.8600 116.5268 0016211 20.5784 339.5093 2.13103194 13822
Glonass 55
1 21855U 92005C 93315.28597801 .00000031 00000-0 00000+0 0 8260
2 21855 64.8479 116.4330 0007397 189.7641 179.7572 2.13101676 13875
JERS-1
1 21867U 92007A 93313.55419735 .00001671 00000-0 14395-3 0 1273
2 21867 97.6652 27.4433 0002578 110.5572 249.5928 14.98678313 95482
GPS BIIA-12
1 21890U 92009A 93313.39394502 -.00000017 00000-0 10000-3 0 4127
2 21890 54.2648 265.8066 0056588 159.6567 200.5598 2.00561052 12569
GPS BIIA-13
1 21930U 92019A 93314.10339565 -.00000029 00000-0 10000-3 0 4135
2 21930 55.5033 26.6120 0059904 166.9359 193.2576 2.00562764 11514
EUVE
1 21987U 92031A 93313.59109805 .00002630 00000-0 11688-3 0 2124
2 21987 28.4319 86.6194 0011120 93.5923 266.5942 15.17768631 78987
SAMPEX
1 22012U 92038A 93315.73335043 .00001700 00000-0 14454-3 0 4150
2 22012 81.6707 39.8026 0119488 28.1675 332.5777 14.91814866 73907
GPS BIIA-14
1 22014U 92039A 93315.13669257 .00000008 00000-0 10000-3 0 3123
2 22014 54.9150 206.4362 0083054 293.6607 65.5368 2.00572713 3363
Glonass 56
1 22056U 92047A 93315.37389569 -.00000017 00000-0 00000+0 0 7286
2 22056 64.9185 356.4446 0005741 262.7607 250.2353 2.13103330 9969
Glonass 57
1 22057U 92047B 93314.99891768 -.00000018 00000-0 00000+0 0 7307
2 22057 64.9396 356.4846 0008949 302.1081 57.8763 2.13102411 9950
Glonass 58
1 22058U 92047C 93314.47076795 -.00000018 00000-0 00000+0 0 7317
2 22058 64.9360 356.5101 0012287 270.8529 89.0678 2.13102661 9987
TOPEX
1 22076U 92052A 93314.27073267 -.00000001 00000-0 10000-3 0 6677
2 22076 66.0401 25.7153 0007858 262.5552 97.4568 12.80930665 58444
KITSAT-A
1 22077U 92052B 93314.21490842 .00000000 00000-0 10000-3 0 3084
2 22077 66.0804 18.4482 0004639 338.0608 22.0210 12.86281812 58628
S80/T
1 22078U 92052C 93314.27081720 .00000000 00000-0 10000-3 0 3082
2 22078 66.0804 17.8476 0005661 350.1564 9.9342 12.86563276 58691
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TOPEX R/B
1 22079U 92052D 93314.31285652 -.00000002 00000-0 10000-3 0 3081
2 22079 66.0697 32.4158 0075239 294.5470 64.7714 12.77664339 58387
GPS BIIA-15
1 22108U 92058A 93312.10866788 -.00000015 00000-0 10000-3 0 3129
2 22108 54.4804 266.5176 0104595 132.7084 228.1727 2.00568741 8484
FREJA
1 22161U 92064A 93313.89043228 -.00000012 00000-0 17171-4 0 3111
2 22161 63.0075 127.3695 0773858 295.7490 56.5628 13.21682165 52815
LAGEOS II
1 22195U 92070B 93314.41991801 -.00000004 00000-0 10000-3 0 2116
2 22195 52.6516 231.9552 0137916 22.0081 338.6339 6.47293869 24772
GPS BIIA-16
1 22231U 92079A 93315.28603482 .00000007 00000-0 10000-3 0 3154
2 22231 54.7652 207.7146 0037836 296.7834 62.9136 2.00568184 7125
GPS BIIA-17
1 22275U 92089A 93314.92645757 .00000008 00000-0 10000-3 0 3133
2 22275 54.6593 205.2636 0048754 254.8691 104.7399 2.00569491 6521
TDRS 5
1 22314U 93003B 93308.08899374 -.00000255 00000-0 10000-3 0 3124
2 22314 0.6006 72.1757 0002611 195.5553 101.8904 1.00552312 3070
GPS BIIA-18
1 22446U 93007A 93308.02292722 -.00000024 00000-0 10000-3 0 3115
2 22446 54.7798 326.5244 0068396 335.9208 23.8058 2.00554698 5413
Glonass 59
1 22512U 93010A 93313.04393686 .00000031 00000-0 00000+0 0 4306
2 22512 64.8730 116.3603 0009100 186.7835 173.2255 2.13101913 5438
Glonass 60
1 22513U 93010B 93315.33098168 .00000030 00000-0 00000+0 0 4374
2 22513 64.8641 116.2968 0007456 182.4120 177.5912 2.13102423 5686
Glonass 61
1 22514U 93010C 93314.62773013 .00000031 00000-0 00000+0 0 4275
2 22514 64.8797 116.3098 0014085 184.9672 175.0489 2.13101635 5641
ASTRO-D
1 22521U 93011A 93313.19729331 .00001260 00000-0 10542-3 0 2111
2 22521 31.1037 17.1753 0076817 103.6443 257.2812 14.92688693 39187
UHF F1
1 22563U 93015A 93292.88575193 .00000058 00000-0 10000-3 0 2054
2 22563 27.0620 303.2814 0008127 266.3173 209.1561 0.99247280 403
GPS BIIA-19
1 22581U 93017A 93306.67479408 -.00000028 00000-0 10000-3 0 2116
2 22581 54.9937 26.7534 0038113 27.8041 332.4752 2.00561467 4407
ProgressM17
1 22588U 93019A 93315.88735095 .00018529 00000-0 16698-3 0 3456
2 22588 51.6185 192.3954 0002579 338.2273 21.8247 15.68230733 35209
ARSENE
1 22654U 93031B 93312.79592387 -.00000046 00000-0 10000-3 0 2081
2 22654 1.4077 114.0599 2932748 160.6003 214.5238 1.42203069 2633
GPS BIIA-20
1 22657U 93 32 A 93293.34104706 -.00000026 00000-0 99999-4 0 2058
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2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21
1 22700U 93042A 93313.25405212 -.00000017 00000-0 10000-3 0 2119
2 22700 54.6561 267.1641 0025230 304.5641 55.1891 2.00570137 2660
Soyuz TM-17
1 22704U 93043A 93315.03485207 .00010309 00000-0 13343-3 0 2278
2 22704 51.6184 201.7248 0005545 23.6260 336.4987 15.59537803442033
NOAA 13
1 22739U 93050A 93315.71422432 .00000145 00000-0 10117-3 0 2060
2 22739 98.9219 256.2517 0010518 19.3504 340.8643 14.10863158 13287
GPS BIIA-22
1 22779U 93054A 93313.33889415 -.00000023 00000-0 10000-3 0 2171
2 22779 54.8948 326.1676 0028095 225.2261 134.6037 2.00556094 1424
Meteor 2-21
1 22782U 93055A 93314.66191362 .00000093 00000-0 79632-4 0 2106
2 22782 82.5507 19.6100 0023265 115.4347 244.9226 13.82991020 9889
SPOT 3
1 22823U 93061A 93314.37084099 -.00000646 00000-0 -29510-3 0 2166
2 22823 98.7389 26.9124 0000581 120.7933 239.3300 14.20013273 6421
STELLA
1 22824U 93061B 93315.70222423 -.00000002 00000-0 74065-5 0 2106
2 22824 98.6806 28.4426 0007065 118.3143 241.8788 14.27093211 6657
KO-25
1 22825U 93061C 93314.21432009 .00000074 00000-0 38114-4 0 2107
2 22825 98.6776 26.9779 0009058 123.9110 236.2934 14.27588935 6448
POSAT-1
1 22826U 93061D 93314.21109339 .00000085 00000-0 42540-4 0 2116
2 22826 98.6786 26.9823 0009430 124.9588 235.2480 14.27691379 6446
HEATHSAT
1 22827U 93061E 93313.64728396 .00000073 00000-0 37711-4 0 2372
2 22827 98.6753 26.4130 0009796 114.7185 245.5017 14.27791287 6362
ITAMSAT
1 22828U 93061F 93311.19458603 -.00344300 00000-0 -15577+0 0 2098
2 22828 98.6698 23.9764 0007012 123.9330 236.4315 14.27759698 6011
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93314.69145093 .00000111 00000-0 52532-4 0 2112
2 22830 98.5800 27.0255 0012337 94.9544 265.3046 14.28015541 6518
ProgressM20
1 22867U 93064A 93315.67563739 .00007860 00000-0 10000-3 0 204
2 22867 51.6160 198.4980 0005225 39.5805 320.5681 15.59537118442144
1993 066A
1 22871U 93066A 93305.20981547 -.00000335 00000-0 00000+0 0 150
2 22871 0.0416 230.3031 0021891 71.0128 295.4491 1.00247170 146
1993 067A
1 22875U 93067A 93315.66749664 .00010497 00000-0 22430-3 0 163
2 22875 82.9399 245.5470 0875444 65.8520 303.1258 13.89244654 380
1993 067B
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1 22876U 93067B 93313.78137215 .00020415 00000-0 40483-3 0 459
2 22876 82.9410 246.9753 0875570 70.6253 298.7384 13.90667142 1991
GPS BIIA-23
1 22877U 93068A 93312.92728531 .00000005 00000-0 10000-3 0 111
2 22877 55.0772 87.3020 0044847 177.7530 182.2599 2.02327820 306
1993 068B
1 22878U 93068B 93312.19520573 .00006742 00000-0 25387-3 0 104
2 22878 35.1531 346.0776 0059963 276.6313 82.7581 15.24715134 1892
Gorizont 28
1 22880U 93069A 93312.38601769 -.00000203 00000-0 10000-3 0 187
2 22880 1.4423 277.2776 0004423 308.0014 50.9726 1.00282835 113
1993 069D
1 22883U 93069D 93302.41277744 -.00000264 00000-0 10000-3 0 14
2 22883 1.5627 278.5623 0011829 335.2585 23.3984 1.00483378 26
1993 069E
1 22884U 93069E 93315.30074904 .00003348 00000-0 98276-3 0 72
2 22884 47.3738 271.6586 7282968 3.4500 359.4755 2.27800089 326
1993 069F
1 22885U 93069F 93314.00588109 .00001053 00000-0 88177-3 0 54
2 22885 47.4097 272.0475 7262409 3.0936 359.5218 2.27350973 300
Unknown
1 22887U 93315.86949285 .00031444 00000-0 39266-3 0 153
2 22887 51.6182 197.5443 0006138 57.7601 302.3725 15.59546676 30671
Cosmos 2266
1 22888U 93070A 93315.88573060 .00000051 00000-0 47352-4 0 122
2 22888 82.9521 245.5280 0047176 268.9785 90.5983 13.74205651 1293
1993 070B
1 22889U 93070B 93314.27386527 .00022864 00000-0 23276-1 0 150
2 22889 82.9497 246.7044 0039299 266.3830 93.2833 13.76173920 1083
1993 071A
1 22904U 93071A 93314.83558279 .00126371 96769-5 19317-3 0 227
2 22904 70.3839 198.1651 0045643 64.9742 295.6194 16.02149201 882
1993 071B
1 22905U 93071B 93311.92447531 .09064086 20195-4 29855-3 0 133
2 22905 70.3948 206.3729 0012203 14.1338 346.8177 16.43572852 412
1993 066B
1 22906U 93066B 93314.77673488 .00058289 -21435-5 42094-3 0 56
2 22906 6.9515 298.2949 7356161 194.0938 120.6346 2.24042582 48
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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328. Re: Sat access to Internet ?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-14 04:27:43 UTC
From: harley@netsys.com
Message-ID: <1993Nov14.042743.18020@netsys.com>
Source record: 28588

Rennie Allen (rgallen@muug.mb.ca) wrote:
: This may be a real stupid question, and I'm not sure if this would be the
: right place to ask this (if not a flame and redirect would be appreciated),
: but I was wondering if it is possible for a private individual, to obtain
: a bi-directional (uplink/downlink - earthstation - is this the terminology ?)
: to the Internet via sattelite ?

For information about economical
Usenet feeds from personal sattelite dishes,
send mail to:

pagesat@pagesat.com

They have a nice system that is resonably priced for private individuals
to get a Usenet feed by sattelite.

329. ANS-317 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 01:04:44 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-317.01.1993@ampr.org>
Source record: 28591
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB SAT @ AMSAT $ANS-317.01
DO-17 TELEMETRY FORMAT

HR AMSAT NEWS SERVICE BULLETIN 317.01 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 13, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-317.01

WD0E Explains Some Of DO-17's Telemetry Format

In response to several requests, the following is a breakdown of inform-
ation in the STATUS line presently being transmitted by DOVE. Note this
applies to DOVE and to this version of the software only.

Counting from the left, the first pair of numbers being 0. All data is in
hex.

0 - Receiver status. Bits 0 - 3 = Filter status of RX
A-D: 0 = 1200, 1 = 4800. Bits 4 - 7 = gain settings of IR
sensor. Normal = 8 = log mode. Normal for whole
position is 80 = IR in log, filters in 1200. NOTE: receivers
in DOVE are for commanding only.
1 - Unused
2 - Unused
3 - BCR Set point. Is adjusted by housekeeping task software to
provide best power transfer from panels to regulators.
Normally 1E during eclipse and in the 80's in the sun.
Roughly corresponds to telemetry channel 22h.
4 - Number of hours since last command. See 18.
5 - BCR status bits. Indicates status of various latches in the
BCR used to gather telemetry.
6 - Transmitter power level, 0 to F. First number is TX1, second
is TX2, although they will normally be the same.
7 - Which transmitter is in use. Bit 0 (LSB) is TX1, bit 1 is
TX2. So a hex 02 indicates TX2 is in use, 01 would be TX1.
8 - Unused
9 - Status of switches in the voice/packet/s-band module (4).
Will allways be D0 in this verson.
10 - Unused
11 - When WOD is in use, shows the number of samples taken/16.
This provides a positive indication a collection has started,
how far it has proceeded and when the sample bucket is full.
12 - Low end of nominal transmitter power range. See 13
13 - High end of nominal transmitter power range. The house
keeping software moves the transmitter power between these
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two numbers to control the charge/discharge of the batteries,
and keep the transmitter power as high as possible.
14 - Time between executions of the power control software in
seconds.
15 - The transmitter power level that is set if the batteries get
abnormally discharged. Normally 5.
16 - Count of errors on the s/c internal bus. This will increment
on DOVE because module 4 no longer consistently responds.
17 - Overflow from 16.
18 - Days till the command timer will expire. Defaults to 2 on
software start. Normally kept at F. This is another of the
software 'watchdogs' that attempt to assure the 2M
transmitter doesn't get stuck on forever. If the s/c does
not hear a command in this number of days, it jumps to the
ROM boot loader firmware which turns all transmitters off.
19 - The module number the errors in 16 came from.
20 - Internal state related to transmitter lock-on avoidance.
Normally 1.

Note that these are somewhat different on the Microsats, and change from
time to time as software is modified.

[The AMSAT News Service (ANS) would like to thank Jim White (WD0E) for this
bulletin item.]

/EX
SB SAT @ AMSAT $ANS-317.02
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 317.02 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 13, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-317.02

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets
are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the
start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO,
OPS Net enthusiasts are asked to move to the alternate frequency of 145.955
MHz.

Date UTC Mode Phs NCS Alt NCS

28-Nov-93 0230 B 39 WJ9F VE2LVC
12-Dec-93 0435 B 180 W9ODI WB6LLO
3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed.
Also, those interested in discussing technical issues or who have questions
about any particular aspect of OSCAR statellite operations, are encouraged
to join the OPS Nets. In the unlikely event that either the Net Control
Station (NCS) or the alternate do not call on frequency, any participant is

invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink
on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-317.03
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 317.03 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 13, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-317.03

Weekly OSCAR Status Reports: 13-NOV-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31

DOVE: DO-17 currently sending AX.25 packet telemetry on a downlink
frequency of 145.825 MHz. Please send any telemetry that you capture
to PY2BJO at his INTERNET address of py2bjo@amsat.org. [WD0HHU]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

LO-19: Operating normally. [WH6I]

KO-23: Up and running. Busy as usual. There are a number of images.
[WH6I]

KO-25: File system is up but not open for uploads. It appears that the
satellite has taken and EIS image, but it is not available. [WH6I]

IO-26: Up and running with a lot of activity. [WH6I]

FO-20: The FO-20 Command Station has reported that a failure was detected
in FO-20 digital command system. Therefore, operation will
continue only in the analog mode for awhile. [JJ1WTK/3]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly
OSCAR status reports. If you have a favorite OSCAR which you work on a
regular basis and would like to contribute to this bulletin, please send

your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

330. Macintosh Amateur Radio Software - Novemeber 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 10:39:42 UTC
From: "Terry M. Stader KA8SCP" <p00489@psilink.com>
Message-ID: <2962449515.6.p00489@psilink.com>
Source record: 28590
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.misc

Newsgroups: rec.radio.amateur.misc,rec.radio.amateur.digital,rec.radio.amateur.packet,rec.radio.shortwave,rec.radio.info
Followup-To: rec.radio.amateur.misc
Approved: rec-radio-info@ve6mgs.ampr.ab.ca

Macintosh Amateur Radio Software - November 1993
Version 1.04.1

Please feel free to distribute this list as widely as possible. Many of you have asked if it is OK to cross-post this list? I don't mind, but I would like to know where it is going. If you think it should be cross-posted to other USENET groups, please let me know so I can try and manage these. We don't want to have any duplication or our welcome will be wore out!

Those of you that can tell me about ANY of these programs compatibility with System 7 would be appreciated! I am going to be adding a System 7 compatability section to EACH description in future releases. If the application is KNOWN to execute properly under System 7, the System 7 anotation will be placed as the last line of the product description. More clarification on levels of System 7 compatibility in the future editions... but this is a start!

Some of the information in this list was gleaned from flyers supplied by the software vendors, or in some cases from reviews in amateur radio publications or the README files included with the archive. Some of the information has not been verified for a long time; please check with the vendors/authors for the latest product specs, pricing, etc.

NEW/CHANGES: I've started adding more version numbers so that our users will know if they have the most current release. Thanks to those that have already sent them in... I'll accept all corrections!

This list contains info on updated for several applications: updated information on Kantronic's Host Master(thanks John-WD1V) and Lar's newest release of Morse Trainer 1.1. Ivo-ON1XK and Adam-PA2AGA both have been busy with new releases of IM/Mac and NET/Mac repsectively. I heard that NET/Mac Pro is coming down the road soon... anyone care to confirnm this? For those of you who don't know about it... it is a commercial endevaor written to support high-speed TCP/IP radio links by some of the hams in Califor

nia. It is a product that has been anticipated for awhile and is eagerly awaited although Adam has been doing an admirable job! Thanks Adam, Ivo and Lars for some great products!

I have been informed that The World, world.std.com, is the newest site carrying the Mac Ham Radio Software. Scott-WY1Z is maintaining these file as the Librarian of the Boston Amateur Radio Club. Look in the following path: /pub/hamradio/mac. Check at the bottom of this list for more information on ftp'able sites carrying Amateur Radio software. The ARRL ListServer is also carrying the latest version of this list... in case you loose this one!

*** Collections ***
<MacNet v5.31>
Join Macnet and get included in the latest version of "Macnet Roster", a HyperCard 2.x stack that now has > 400 members and is the proverbial "Who's Who" of hams using Macs. You'll find "Macnet Roster" a great tool for finding out who, what and how other hams are using their Macs with their ham stations. It even includes this file!
Send $30.00($40.00 DX) check or money order to: WD1V, John Seney, 144 Pepperidge Drive Manchester, NH 03103 USA.
All disks shipped First Class Mail PPd. Get the COMPLETE Macnet Software Collection ppd. on 10 disks!
Based on your interests, you'll also receive public domain shareware received by our members.
System 7

<Project Mac>
Contest logging, antenna design, satellite tracking, clip art, etc. Microsoft BASIC required for many of the programs. Most of this software is now available in the MacNet collection.
Send three formatted 800K Macintosh disks with stamped, self-addressed disk mailer to Stan Horzepa, WA1LOU, 75 Kreger Drive, Wolcott, CT 06716. (Compuserve: 70645,247)

<Amateur Radio Software for Macintosh>
Extensive catalog including logging, Morse code, gray line, test preparation, satellite tracking, contesting, and packet radio programs.
ZCo Corporation, P.O. Box 3720, Nashua, NH 03061. NOTE: This company has been rumored to be out of business!

<Amateur Radio #1>
Contains satellite tracking, Morse code, attenuator design, and Ohm's law calculator programs.
Kinetic Designs, P.O. Box 1646, Orange Park, FL 32067.

*** Test preparation ***
<Ham Test Stacks>
HyperCard stacks containing the entire question pool for each license class. Can be used for preparation or generating actual tests.
The current releases are: Novice v4.1(new questions eff. 7/1/93), Technician v4.0(new questions effective 7/1/93), General v2.4, Advanced v2.4, Extra v2.4
If you wish to receive these PUBLIC DOMAIN stacks, please send a SASE (self addressed STAMPED envelope - 2 ounces postage = .52) and 800K diskette to the author: Diana L. Carlson, 3 Spruce Street, Hudson, NH 03051. Diana will no longer send out the stacks unless the envelope has sufficient postage for return mail (in general, that means .52-.98, depending on size of envelope) and for those who send a standard business envelope, she takes no responsibility for the condition of the diskette through US mail.

Available via anonymous FTP from various sites, including uxc.cso.uiuc.edu (/pub/ham-radio). NOTE: The newest releases of Novice and Technician stacks are available at uxc.cso.uiuc.edu (5/6/93) Author is available via Internet: dls@genrad.com
System 7 savy with HyperCard 2.1

<MacHam>
Test generators and study aids for the Technician, General, Advanced, and Extra class written elements. Includes the complete question pool for each license. Hypercard based.

Coyne Co., P.O. Box 2000-200, Mission Viejo, CA 92692.
System 7 with HyperCard 2.1

*** Morse code practice ***
<N6MZV Morse Trainer>
Lets you practice any combination of letters, numbers, and/or punctuation characters. Can send user-created text files.
RT Martin, N6MZV, 10382 Orange Avenue, Cupertino, CA 95014. Also available via anonymous FTP from ftp.apple.com (/pub/ham-radio). Shareware.

<Morse Code Tutor v1.3> - used to be called Morse Tutor
Sends random groups of letters, numbers, and/or punctuation characters.
Available via anonymous FTP from ftp.apple.com (/pub/ham-radio). Or send formatted 800K Macintosh disk with stamped, self-addressed return disk mailer to Jack Brindle, WA4FIB, 726-175th Street SW, Bothell, WA 98012; Compuserve: 73365,606.

<MorseMania V1.0>
Designed for those already familiar with Morse code who want to improve their speed. Allows code practice at various speeds and audio pitches. Can generate random sequences or play the contents of user-created text files. Freeware.
Available via anonymous FTP from whirlwind.stanford.edu (/pub). Contact Edward Plumer, KM6IQ, for more information; Internet: plumer@isl.stanford.edu.

<MacMorse>
Randomly sends chosen characters. Lets you create your own practice files.
David A. Kall, 700 Marine Parkway #314, New Port Richey, FL 34652.

<MacMorse v1.3>
MacMorse is designed to help you learn Morse code and improve your receiving speed. It has several ways that it can send letters and punctuation. Shareware.
Doug Havenhill, Dynamics and Control, 7143 West Sunnyside Drive, Peoria, AZ 85345.

<MacSamuel>
Sends random words, random character groups, and user-created text files. Can also create simulated QSOs with randomly generated text and callsigns.
Avant Systems, P.O. Box 5437, Pittsburgh, PA 15206.

<Zihua Morse>
Designed to teach Morse code to beginners and to improve the accuracy and speed of advanced users. Responses can be typed into the computer; the program will calculate accuracy and timing statistics for each session. Optional speech synthesizer reads the characters out loud for an accuracy check.
Zihua, P.O. Box 51601, Pacific Grove, CA 93950.

<Sparks-II v2.0.5>
More Code training program.
Available for anonymous ftp at rahul.net /pub/davidj/radio

<Morse Master v1.0>
The newest of the morse code training programs. MM calculates the real speed as follows: Real speed = Number of Words/end time - start time. And the lengh of word is generating randomly, so if you set even 5WPM, sometimes another value will appear. However you should believe the slidebutton's value. If you repeat many times, the average speed should be 5WPM

(if not... anyway, believe the slidebutton's value).
Archive is available mac.archive.umich.edu, path:
mac/util/organization/morsemaster1.0.sit.hqx
The author can be reached thru the following e-mail addresses:
h79261a@kyu-cc.cc.kyushu-u.ac.jp. (Eiji AOL account is no longer valid - moved back to Japan after his studies.)

<Morse Trainer-US v1.1>
MorseTrainer is a powerful tool for learning and training Morse code. Features: Three different training modes: user text, random text, library text; Arbitrary signal pitch and timbre; Arbitrary speed and tempo; Multi-alphabet support; Random text generator; Text library editor; On-line alphabet; On-line manual; Help Balloons; And a lot more. New features in 1.1: Enhanced sound generator, volume control and risetime control. The pitch is set in steps of 10Hz instead of using MIDI frequencies; Speed and te

mpo limits increased to 80 words/minute as a result of the enhanced sound generator; User-selectable font in the Misc settings dialog.
FREEWARE!
This version uses TrueType fonts instead on bitmaps fonts so that the user can distinguish 0(zero) from O(character). Furthermore speed and tempo can be given in either characters/minute or words/minute.
Archive is available mac.archive.umich.edu, path: mac/util/organization/
Author is available via internet: sund@tde.lth.se
System 7 savy

<CW Speed Builder v3.0>
This program is for improving Morse Code (CW) reception skill. The major difference between this and other Morse Code training programs is that this one will not continue sending until you provide the correct answer.
Major changes which have been suggested and implemented since last version include: after three incorrect responses the program shows the correct character; the list of characters at the end which will show those you know and those you need more practice on; the frequency of the tone has been changed; volume of the tone has been reduced; the character " - " has been added (dah dit dit dit dah)
Comments can be sent as follows: America Online:K7UPJ, Internet:k7upj@aol.com, Packet radio:K7UPJ@KA3T, Compu$erv:70521,2356, Mail:Box 84, Cascade, MD 21719

*** Packet and other digital modes ***
<NET/Mac 3.2.31>
Allows simultaneous TCP/IP, AX.25, and NET/ROM connections. Requires a TNC with KISS mode. Copyright, but free for noncommercial use. The latest releases have added support of multi-port serial boards like AE's QuadraLink. It is now possible to have up to 10 TNCs connected up to a Nubus Mac!
Adam van Gaalen, PA2AGA, (Internet: adam@IGG.TNO.NL) has been making the modifications to NET/Mac. This version (and others) is available via anonymous FTP from ucsd.edu (/hamradio/packet/tcpip/pa2aga), mac.archive.umich.edu and sumex-aim.stanford.edu.
System 7

<Domain-to-Hosts Converter 1.0r3>
This application will create a hosts.net file from the domain.txt file that PC owners use with NOS. Created by Ken-NS1C is available on many TCP/IP packet switches in New England.program. Version 1.0r3 is the latest release.
System 7

<IM/Mac 1.0b27t>
Mailer program for use with the SMTP protocol. Alternative to the BM program that comes with NET/Mac. Written by Ivo van Ursel, ON1XK. Ivo is continuosly updating his mailer program. His newest release supports built-in BinHex support, selectable sound chimes for incoming mail, "quoting" of forwarded messages and lots more. If you are not using this program... why not? Check for the latest release in the directory before "blind" ftp'ing. This software supports System 7's Ballon Help and is System 7 savy!
Available via anonymous FTP from ucsd.edu (/hamradio/packet/tcpip/pa2aga).
Author is available via internet: on1xk@igg.tno.nl <<-- new address for Ivo
System 7 savy

<SoftKiss 1.8>
Control panel device that emulates a TNC running in KISS mode. For use with packet-radio modems such as the Baycom kit and PacketMac Modem. Version 1.8 July 9 1993 update since 1.6. KD6PAG found a bug in quoting recieved escape and end characters is sofktiss 1.6. The bug and the fix and patch are all correct, thanks for some great detective work. Lots of doc files and drawings included in this archive! Requires the Serial Tool from Apple's Communications Toolbox!
Available on the HAMNET forum of Compuserve, America Online and via anonymous FTP from akutaktak.andrew.cmu.edu (/aw0g).
System 7

<Savant 1.0.1>
A new packet terminal front-end by the author of Virtuoso. Savant has a split window interface, but it's also a multi-window, multi-connection
interface and will work with almost any TNC, unlike MacRatt or HostMaster.
A demo version of the product is available at cpre1.ee.iastate.edu (pub/ke0ph) or via US Mail, send a SAS disk mailer and disk to CM Technologies, Inc., RR#1, Box 83A, Kelley, IA 50134 (515) 597-2051.
System 7, 32-bit, '040 cache clean and it supports the required AppleEvents.

<MacRatt with FAX>
Terminal program for use with AEA's PK-232 multimode controller. Supports packet, CW, RTTY, AMTOR, and facsimile. Includes cable.
Advanced Electronic Applications, P.O. Box C-2160, Lynnwood, WA 98036.

<Host Master 1.2>
The Kantronics Host Master software provides an easy to use, multifunctional terminal program for the TNC. Host Master Mac is a simultaneous multi-mode terminal program for the Mac written by Kevin Krueger, N0IOS and marketed by Kantronics. It is a commercial product available from most of the ham radio stores and supports single and multiple packet connects, packet monitoring, and HF operation (with KAM) each on a separate window, all at the same time. This package retails for $69.95 in the US and is int

uitive, friendly, and well supported by Kantronics. Current version as of 10/20/93 is 1.2. It is hoped that a future version will support FAX but currently Hostmaster supports PACKET, AMTOR, RTTY, PACTOR (KAM ver. 6.0), CW, and NAVTEX.
Features: text and binary file transfer; packet conferencing; color or B&W windows; cut, copy, paste between windows; call exchange and data/time stamp; auto startup/shutdown commands; transmit buffers for each mode; simultaneous dual port, multiple connects; supports KPC-2, KPC-2400, KPC-4, KAM and Data Engine. Requires: Macintosh Plus w/ System 6.05 or better. Current Kantronics firmware.
System 7 compatible, with baloon help

<PacketTracker 1.05>
PacketTracker ver 1.05 is a program that monitors packet activity and keeps track of what is going on. It draws a graphical map showing who is talking to who and displays statistics of all current stations and keeps a running tally of activity.
PacketTracker was written for both the casual packet user and the network manager or BBS operator. The casual packet user will be able to learn a great deal about what is happening in packet around him; which stations are generating the most data and what some of them are. he will be able to see graphically what stations he can hitdirectly and which ones he cannot.
For the network manager and BBS operator, PacketTracker provides extensive insight to the operation of the local network and problems such as excessive retries on a path. It also allows for extensive logging of channel utilization and other pertinate information.
NOTE: This application requires the Apple's Serial Tool from the Communications Toolbox.
System 7

*** RTTY ***
<MacTTY>
Decodes Baudot or ASCII transmissions. Can also be used for packet radio and other digital modes (including landline data communications). Includes split screen, a 15,000-character type-ahead buffer, and canned messages.
Summit Concepts, Suite 102-190, 1840 41st Ave., Capitola, CA 95010.

<WeFaxWorks>
Weather facsimile terminal program for use with Kantronics TNCs.
Kantronics rfconcepts, 1202 E. 23rd Street, Lawrence, KS 66046.

<MacMultiCom 1.0>
MFJ sells MacMultiCom 1.0 for their 1278 multimode controller. MacMultiCom supports all of the modes of the 1278: packet, rtty, ascii, pactor, amtor, gray scale faxes, and many different formats of color sstv. The program requires a minimum of a MacPlus and a hard disk. Requires a color Macintosh and System 7 for best results.
System 7

*** Logging ***
<Ham Radio Station Logbook>
HyperCard stack that stores and displays radio contact information. Automatically stamps entries with time and date. Contacts can be sorted by frequency, call sign, or date of contact. Includes report formats, a "Q-code" reference list, and on-line help.
SanSoft, 892 E. Quail Place, Highlands Ranch, CO 80126. (The same program appears to be available from Heizer Software, 1941 Oak Park Blvd., Suite 30, Pleasant Hill, CA 94523.)

<FDLog!>
Contact logging and duping program. Can transmit any of ten programmable CW messages. Generates real-time statistics on QSO rates.
System One Control, 3900 85th Ave N, Suite 200, Brooklyn Park, MN 55443.

<MacContest 3.5>
Allows real-time or post-contest logging of a wide variety of contests. Checks for dupes, figures scores instantly, and offers various printouts. Interfaces to TNCs for CW and RTTY contests, to DX packet clusters, to Kenwood transceivers, and to MacinTalk for easy post-contest entry.
Gerald Eberle, HB9CEY, P.O. Box 13, CH-4417 Ziefen, Switzerland.

<LOGic>
(Macintosh version scheduled.) Lets you define the rules determining dupes (such as once per band or once per contest). Displays heading, distance, and other information about the country being worked. Automatically enters contact time; if interfaced directly to a radio, also enters the frequency, band, and mode. Shows status toward earning amateur-radio awards. User-definable database fields. Exchanges data with other programs.
Personal Database Applications, 2634 Meadow Bend Court, Duluth, GA 30136.

<HF Logger 1.2>
A real fine HyperCard logging program! (hey... thats all I got!)
N0QGQ

<Simple Log .2b>
This little utility is a handy way to create a logging file that you can later import into any data base for analysis, etc. It also shows you that just about anyone can use Think C and create something on the Mac! Let me know if you'd like the source code. WD1V @ WA1WOK.NH.USA.NA
Author is John Seney - WD1V, e-mail address is jseney@aol.com. For a copy of this program, mail a SASE disk mailer and 800K disk to: John D. Seney, WD1V, 144 Pepperidge Dr., Manchester, NH 03103
System 7

<Marathon>
Contesting/logging- Have seen references to (March 92 CQ magazine) and heard good things about MARATHON by N 0 IOS. I believe a demo was available for $8. Last address known is: Kevin Krueger, N0IOS, 1780 Ruth St., St.Paul, MN 551O9

*** Propagation, gray line, DX headings ***
<DX Map v1.1>
Displays a map of the world with the terminator. Gives location, prefixes, zone numbers, distance, and heading for any country you select. Freeware. Requires HyperCard 2.0.
Available via anonymous FTP from joker.optics.rochester.edu (in the /ham/dxmap directory). Or send a formatted 800K Macintosh disk with a stamped, self-addressed disk mailer to Len Saaf, NV2Z, 52 Raleigh Street, Rochester, NY 14620 (Internet: saaf@joker.optics.rochester.edu).

<SatTrak>
Primarily a satellite tracking program, but also calculates beam headings, Maidenhead grid locations, MUF plots, and band openings. Shareware.
Available via anonymous FTP from sumex-aim.stanford.edu (/info-mac/app). Or send a formatted 800K or 14.MB Macintosh disk with stamped, self-addressed disk mailer to Mike Pflueger, WD8KPZ, 6207 W. Beverly Lane, Glendale, AZ 85306.

<Sun Clock>
Desk accessory. Displays a color map of the world, including the terminator. Indicates current time for any location.
MLT Software, Inc., P.O. Box 368, Portland, OR 97207.

<DX Window>
Draws a great-circle world map centered on your QTH, with day/night terminator indicated. Displays over 400 DX locations with prefixes and beam headings.
Engineering Systems, Inc., P.O. Box 939, Vienna, VA 22183.

<Skycom 1.1>
Enter solar flux and get propagation predictions to desired areas of the world.
Engineering Systems, Inc., P.O. Box 939, Vienna, VA 22183.

<Skycom 1.5>
Provides sunlight status at both ends of a path; MUF, F0F2, and FOT frequencies; S/N ratio of the link; and other information.
Engineering Systems, Inc., P.O. Box 939, Vienna, VA 22183.

<DX Helper v1.57B>
Displays beam heading, distance, gray line, and propagation information. Generates great-circle maps. Identifies prefixes, zones, and oblasts. Includes code practice.
MacTrak Software, P.O. Box 1590, Port Orchard, WA 98336.

<Mac MiniMUF v5.1>
A greyline and propagation predictor based on the PC version of MiniMUF by K4CFV. It is available directly from him for the price of a formatted disk and SASE (disk mailer).
His address in callbook or: Bob Stamper K4CFV, 12510 Shadowrun Blvd., Riverview, FL 33569

<Mac ShortWave v1.2>
A program called Mac Shortwave that figures MUF and LUF.
BXA Research in Plano, Texas

*** Satellite tracking ***
<SatTrack v1.02>
Tracks one satellite across a world map as it moves, displays the instantaneous position of several satellites, or generates tables of all satellites visible from a certain location at a given time. Also calculates beam headings, Maidenhead grid locations, and MUFs.
Shareware.
Available via anonymous FTP from sumex-aim.stanford.edu (/info-mac/app). Or send a formatted 800K Macintosh disk with stamped, self-addressed disk mailer to Mike Pflueger, WD8KPZ, 6207 W. Beverly Lane, Glendale, AZ 85306.

<MacSat v3.1>
Tracks up to 21 satellites simultaneously, either in simulation or real-time mode. Text screen displays ground-track coordinates, range, mean anomaly, visibility (azimuth and elevation) and Doppler shift frequency information for all satellites being tracked. Graphical screen portrays the satellite ground tracks superimposed on a world map. Polar plot displays graphically the precise location of each visible satellite above the observer's horizon.
Developed by the Geodetic Research Laboratory of the University of New Brunswick.
Available from Richard B. Langley, R.R. 12, Fredericton, N.B. E3B 6H7, Canada (Internet: lang@unb.ca). A demo version of MacSat may be ftp'ed from directory PUB.CANSPACE on unbmvs1.csd.unb.ca.
System 7

<OrbiTrack>
<OrbiTrackFPU v2.1.4>
Calculates look angles to selected satellites, plots current satellite positions on a world map, and displays the visible passage of a satellite against background stars (either within the program itself or via a data file that can be read into the Voyager astronomy program). Please note that one version requires an FPU to operate!
BEK Developers, P.O. Box 47114, St. Petersburg, FL 33743. (Bill Bard, CompuServe:

75366,2557) (Note: This replaces BEK's previous MacSat program, which was not related to the program of the same name from UNB.)

<QuikMac>
Macintosh version of N4HY's QuikTrak program. Requires Microsoft BASIC. AMSAT, P.O. Box 27, Washington, DC 20044.

<Satellite Orbit Prediction Program>
Macintosh conversion of W3IWI program. Requires Microsoft BASIC.
Send formatted 800K Macintosh disk with stamped, self-addressed disk mailer to Earl Skelton, N3ES, 6311 29th Place NW, Washington, DC 20015. Or send self-addressed stamped envelope for source listing.

<Satellite Pro>
Uses world maps and tables to indicate rising and setting schedules, current locations, mutual visibility opportunities, and footprints. Includes Mercator, polar, and great-circle displays. Optional antenna control.
MacTrak Software, P.O. Box 1590, Port Orchard, WA 98366.

<MacSPOC>
Author is on AOL and can be reached as adamod@aol.com via the internet.

*** Antenna design ***
<MacMiniNEC>
Chris Smolinski, N3JLY, 40 South Lake Way, Reisterstown, MD 21136.

*** Radio control ***
<ICOM Radio Control>
Provides a Macintosh interface for controlling ICOM transceivers that use the CI-V remote-control system. Lets you quickly change frequencies and modes. Also does logging and duping. Requires a CI-V to RS-422 converter (schematic included with program).
KE6FG Software, 9763 Pali Avenue, Tujunga, CA 91042.

<FreqValet>
Provides frequencies and DX program info for shortwave radio listeners. The program databases update automatically at 15, 30, or 60 minute intervals, thus providing a continuous display of broadcasts on-the-air at any given time in a spreadsheet like format. Features include sorting of data, scanning, and on-screen changing of databases. The program will convert Tom Sundstrom's dBase shorwave broadcast listing to FreqValet format and will do the same for Shorwave Navigator users. Separate cards are pro

vided for DX Programs, Ship to Shore, and Utility broadcasts. Computer control modules are available at extra cost for the Drake R8, Kenwood R-5000, JRC NRD-525, and NRD-535 receivers.
DX Computing, 232 Squaw Creek Road, Willow Park, TX 76087. Telephone (817) 441-9188 or (817) 441-5555 (fax).
Author is available via internet: dxcomp@aol.com
System 7 with HyperCard 2.1

*** Ham radio BBSs ***
<Digikron Systems BBS>
Various ham-related applications, including logging, propagation, Morse code, and packet. (408) 253-1309.

<MacScience BBS>
Various ham-related applications, including antenna design, propagation, WEFAX, packet, and Morse code. (408) 866-4933.

<N8EMR BBS>
Various ham-related files, including packet, DXing, and contesting software; AMSAT bulletins; and several ham newsletters. (614) 895-2553. Also available via FTP on AMPRnet at 44.70.0.1.

<WB3FFV BBS>
Various ham-related software, including packet, contesting, and Morse code applications. (410) 661-2475, 661-2598, and 661-2648.

<ChowdaNet BBS>
(more info at a later date)

*** Online Services carrying Ham Radio software ***
<America Online>
Supports Macintosh, PC's DOS & Windows versions, PS/1, Apple //s, Casio Zoomer. Ham Radio Club (keyword = ham radio) supports all computer types. Software for amateur radio, scanners, swl'ers and general electronics. For 10 FREE hours of trial time send your snail mail address to tstader@aol.com or call 1-800-827-6364 Ext. 6285. This site NOT ftb'able (yet). Internet e-mail.

<CompuServe>
Supports any communications software on most computers Ham Radio area (go hamnet) supports all types of communications formats. Call 1-800-848-8199 for information. This site NOT ftb'able. Internet e-mail.

<Delphi>
(more info at a later date) Internet e-mail

<GEnie>
(more info at a later date) Internet e-mail

<Prodigy>
Has ham radio message areas, no downloadable software. Limited internet e-mail.

==========
Misc. Internet FTP sites for Amateur Radio Macintosh software

joker.optics.rochester.edu (/ham)
sumex-aim.stanford.edu (/info-mac/app)
mac.archive.umich.edu various locations
uxc.cso.uiuc.edu (/pub/ham-radio)
ucsd.edu (/hamradio) many different subdirectories
(/hamradio/incoming) newest files temp holding area
(/hamradio/packet/tcpip/pa2aga) NET/Mac & IM/Mac area
ftp.apple.com (/pub/ham-radio)
akutaktak.andrew.cmu.edu (/aw0g) softkiss-mac
nic.switch.ch (/software/mac/ham-radio)
world.std.com (/pub/hamradio/mac)

If you know of any other sites, please e-mail me info so I may keep this list as up to date as possible!

- Terry

Thanks for all of the notes and updates! Keep them coming. Did I get all of the versions right?

==========
NOTE: Much of this work was done by Patty-N6BIS as she collected information from many vendors. I would like to keep this list as up to date as possible. Please feel free to drop me a note if you have any additional software to this list.

DISCLAIMER: The software listed is not endorsed by Apple Computer, Inc.(c) nor has it all been tested by the author/providers of this information.
****
* Recompiled by Terry Stader - KA8SCP (tstader@aol.com) *
* Original list compiled by Patty Winter - N6BIS *
* New information last added 9/93 *
* some information not rechecked since early 1991. *
****

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331. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 12:00:25 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-753364821@unomaha.edu>
Source record: 28589
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

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Posted-By: auto-faq 2.4
Archive-name: radio/personal-intro
Revision: 1.5 09/18/93 16:49:31
Changes: new mailing lists, .packet rmgroup, and .policy updates

(Note: The following is reprinted with the permission of the author.)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 18 September
1993 to add the mailing lists for the new rec.radio.amateur newsgroups, to
note the rmgroup of rec.radio.amateur.packet, and to officially retire some
(in)famous threads of discussion on rec.radio.amateur.policy.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
arrangement, but one was that the system was not supposed to be used for
commercial purposes. Since one of hams' favorite pastimes is swapping
gear, it was natural for hams to post messages about equipment for sale
to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use
restriction, and after some argument, a group was created specifically
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for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize

this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, should be removed by September 21st, 1993. It is obsolete, and you should use .digital.misc instead (or the appropriate new mailing list, mentioned below). The group has .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. Recent changes to the Amateur Radio Rules (FCC Part 97) have finally laid to rest the Great Usenet Pizza Autopatch Debate as well as complaints about now-preempted local scanner laws hostile to amateurs, but plenty of discussion about what a bunch of rotten no-goodniks the local frequency coordinating body is, as well as the neverending no-code debate, may still be found here.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas,

commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

Except for rec.radio.swap and rec.radio.cb, all of these newsgroups are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
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Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

332. mir on mfj 1278<<help>>

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 13:26:49 UTC
From: Terry.Murphy@launchpad.unc.edu
Message-ID: <2c802p$25e@samba.oit.unc.edu>
Source record: 28592

I have been trying to make contact with Mir on 2m packet but have been
unsuccessful....only a few Mir busy signals
I am using Lan-link 2.2 and the MFJ with standard defaults...is there a way
to fine tune the parameters to make contact with Mir easier???
Any other tips would be welcome too...
73 de ab4vj/terry
terry.murphy@launchpad.unc.edu

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The opinions expressed are not necessarily those of the University of
North Carolina at Chapel Hill, the Campus Office for Information
Technology, or the Experimental Bulletin Board Service.
internet: laUNChpad.unc.edu or 152.2.22.80

333. ORBS$316.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 18:34:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-316.o.1993@ampr.org>
Source record: 28593
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-316.O
Orbital Elements 316.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX November 12, 1993
BID: $ORBS-316.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93304.58449144
Element set: 208
Inclination: 27.1748 deg
RA of node: 358.4423 deg
Eccentricity: 0.6020940
Arg of perigee: 126.4893 deg
Mean anomaly: 305.1053 deg
Mean motion: 2.05881853 rev/day
Decay rate: -8.1e-07 rev/day^2
Epoch rev: 7806
Checksum: 297

Satellite: UO-11
Catalog number: 14781
Epoch time: 93313.58249069
Element set: 611
Inclination: 97.7981 deg
RA of node: 333.4777 deg
Eccentricity: 0.0010810
Arg of perigee: 254.3694 deg
Mean anomaly: 105.6328 deg
Mean motion: 14.69080500 rev/day
Decay rate: 2.29e-06 rev/day^2
Epoch rev: 51806
Checksum: 312

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93314.04939054
Element set: 811
Inclination: 82.9214 deg
RA of node: 130.8225 deg
Eccentricity: 0.0010360
Arg of perigee: 275.4234 deg
```

Mean anomaly: 84.5738 deg
Mean motion: 13.72325356 rev/day
Decay rate: 1.7e-07 rev/day^2
Epoch rev: 31984
Checksum: 288

Satellite: AO-13
Catalog number: 19216
Epoch time: 93313.91272759
Element set: 812
Inclination: 57.8912 deg
RA of node: 284.9332 deg
Eccentricity: 0.7213964
Arg of perigee: 328.0558 deg
Mean anomaly: 3.5561 deg
Mean motion: 2.09724845 rev/day
Decay rate: -2.11e-06 rev/day^2
Epoch rev: 4141
Checksum: 307

Satellite: FO-20
Catalog number: 20480
Epoch time: 93310.07362541
Element set: 607
Inclination: 99.0217 deg
RA of node: 139.2984 deg
Eccentricity: 0.0541030
Arg of perigee: 125.0547 deg
Mean anomaly: 240.2545 deg
Mean motion: 12.83221816 rev/day
Decay rate: -5.0e-08 rev/day^2
Epoch rev: 17551
Checksum: 267

Satellite: AO-21
Catalog number: 21087
Epoch time: 93314.29055835
Element set: 367
Inclination: 82.9398 deg
RA of node: 304.7020 deg
Eccentricity: 0.0035176
Arg of perigee: 337.0887 deg
Mean anomaly: 22.8703 deg
Mean motion: 13.74528243 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 13950
Checksum: 309

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93313.61484132

Element set: 611
Inclination: 82.9251 deg
RA of node: 174.2800 deg
Eccentricity: 0.0030580
Arg of perigee: 1.6907 deg
Mean anomaly: 358.4344 deg
Mean motion: 13.74029689 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 13849
Checksum: 298

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93312.79592387
Element set: 208
Inclination: 1.4077 deg
RA of node: 114.0599 deg
Eccentricity: 0.2932748
Arg of perigee: 160.6003 deg
Mean anomaly: 214.5238 deg
Mean motion: 1.42203069 rev/day
Decay rate: -4.6e-07 rev/day^2
Epoch rev: 263
Checksum: 280

/EX

334. ORBS$316.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 18:36:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-316.d.1993@ampr.org>
Source record: 28594
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-316.D
Orbital Elements 316.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX November 12, 1993
BID: $ORBS-316.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93314.26240544
Element set: 911
Inclination: 98.6068 deg
RA of node: 36.8706 deg
Eccentricity: 0.0011455
Arg of perigee: 111.4215 deg
Mean anomaly: 248.8190 deg
Mean motion: 14.29802927 rev/day
Decay rate: 1.28e-06 rev/day^2
Epoch rev: 19830
Checksum: 295

Satellite: AO-16
Catalog number: 20439
Epoch time: 93314.25650448
Element set: 711
Inclination: 98.6135 deg
RA of node: 37.8762 deg
Eccentricity: 0.0011873
Arg of perigee: 112.5374 deg
Mean anomaly: 247.7066 deg
Mean motion: 14.29859897 rev/day
Decay rate: 9.3e-07 rev/day^2
Epoch rev: 19831
Checksum: 335

Satellite: DO-17
Catalog number: 20440
Epoch time: 93314.72182474
Element set: 711
Inclination: 98.6156 deg
RA of node: 38.5937 deg
Eccentricity: 0.0011919
Arg of perigee: 110.1078 deg
```

Mean anomaly: 250.1390 deg
Mean motion: 14.29997154 rev/day
Decay rate: 1.08e-06 rev/day^2
Epoch rev: 19839
Checksum: 311

Satellite: WO-18
Catalog number: 20441
Epoch time: 93314.27363549
Element set: 712
Inclination: 98.6152 deg
RA of node: 38.1661 deg
Eccentricity: 0.0012426
Arg of perigee: 111.7995 deg
Mean anomaly: 248.4510 deg
Mean motion: 14.29974899 rev/day
Decay rate: 9.2e-07 rev/day^2
Epoch rev: 19833
Checksum: 325

Satellite: LO-19
Catalog number: 20442
Epoch time: 93314.26623889
Element set: 711
Inclination: 98.6160 deg
RA of node: 38.3657 deg
Eccentricity: 0.0012902
Arg of perigee: 111.6029 deg
Mean anomaly: 248.6529 deg
Mean motion: 14.30067157 rev/day
Decay rate: 1.07e-06 rev/day^2
Epoch rev: 19834
Checksum: 304

Satellite: UO-22
Catalog number: 21575
Epoch time: 93313.78644466
Element set: 411
Inclination: 98.4598 deg
RA of node: 27.4629 deg
Eccentricity: 0.0006935
Arg of perigee: 224.2634 deg
Mean anomaly: 135.7989 deg
Mean motion: 14.36863544 rev/day
Decay rate: 1.17e-06 rev/day^2
Epoch rev: 12157
Checksum: 334

Satellite: KO-23
Catalog number: 22077
Epoch time: 93314.21490842

Element set: 308
Inclination: 66.0804 deg
RA of node: 18.4482 deg
Eccentricity: 0.0004639
Arg of perigee: 338.0608 deg
Mean anomaly: 22.0210 deg
Mean motion: 12.86281812 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5862
Checksum: 255

Satellite: AO-27
Catalog number: 22825
Epoch time: 93305.38322237
Element set: 208
Inclination: 98.6783 deg
RA of node: 18.2116 deg
Eccentricity: 0.0008754
Arg of perigee: 149.2634 deg
Mean anomaly: 210.9045 deg
Mean motion: 14.27587035 rev/day
Decay rate: 5.7e-07 rev/day^2
Epoch rev: 517
Checksum: 300

Satellite: IO-26
Catalog number: 22826
Epoch time: 93305.66096033
Element set: 209
Inclination: 98.6791 deg
RA of node: 18.4934 deg
Eccentricity: 0.0009019
Arg of perigee: 149.5441 deg
Mean anomaly: 210.6266 deg
Mean motion: 14.27689613 rev/day
Decay rate: 7.6e-07 rev/day^2
Epoch rev: 522
Checksum: 311

Satellite: KO-25
Catalog number: 22830
Epoch time: 93314.69145093
Element set: 211
Inclination: 98.5800 deg
RA of node: 27.0255 deg
Eccentricity: 0.0012337
Arg of perigee: 94.9544 deg
Mean anomaly: 265.3046 deg
Mean motion: 14.28015541 rev/day
Decay rate: 1.11e-06 rev/day^2
Epoch rev: 651

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Checksum: 267

/EX
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335. ORBS$316.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 18:39:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-316.w.1993@ampr.org>
Source record: 28595
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-316.W
Orbital Elements 316.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX November 12, 1993
BID: $ORBS-316.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93300.72651427
Element set: 608
Inclination: 99.0865 deg
RA of node: 343.0970 deg
Eccentricity: 0.0014906
Arg of perigee: 151.8994 deg
Mean anomaly: 208.2999 deg
Mean motion: 14.13555759 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 45749
Checksum: 353

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93308.02577200
Element set: 508
Inclination: 98.5151 deg
RA of node: 318.8770 deg
Eccentricity: 0.0012448
Arg of perigee: 270.5362 deg
Mean anomaly: 89.4395 deg
Mean motion: 14.24841200 rev/day
Decay rate: 1.07e-06 rev/day^2
Epoch rev: 37053
Checksum: 298

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93313.86326152
Element set: 210
Inclination: 82.5401 deg
RA of node: 83.0499 deg
Eccentricity: 0.0017920
Arg of perigee: 77.7053 deg
```

Mean anomaly: 282.6113 deg
Mean motion: 13.84696783 rev/day
Decay rate: 6.0e-07 rev/day^2
Epoch rev: 29200
Checksum: 293

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93313.98312645
Element set: 210
Inclination: 82.5385 deg
RA of node: 118.8020 deg
Eccentricity: 0.0017396
Arg of perigee: 88.4059 deg
Mean anomaly: 271.9055 deg
Mean motion: 13.16962219 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25440
Checksum: 300

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93307.95823027
Element set: 408
Inclination: 99.1482 deg
RA of node: 286.6377 deg
Eccentricity: 0.0012789
Arg of perigee: 46.5585 deg
Mean anomaly: 313.6658 deg
Mean motion: 14.12928630 rev/day
Decay rate: 1.39e-06 rev/day^2
Epoch rev: 26340
Checksum: 329

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93314.44174536
Element set: 211
Inclination: 82.5186 deg
RA of node: 318.3186 deg
Eccentricity: 0.0015511
Arg of perigee: 116.9458 deg
Mean anomaly: 243.3286 deg
Mean motion: 13.84348503 rev/day
Decay rate: 4.2e-07 rev/day^2
Epoch rev: 23742
Checksum: 302

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93313.78275180

Element set: 912
Inclination: 82.5475 deg
RA of node: 62.1477 deg
Eccentricity: 0.0016698
Arg of perigee: 110.3082 deg
Mean anomaly: 249.9836 deg
Mean motion: 13.16023732 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19425
Checksum: 296

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93314.71352062
Element set: 711
Inclination: 82.5501 deg
RA of node: 22.0091 deg
Eccentricity: 0.0017060
Arg of perigee: 42.7604 deg
Mean anomaly: 317.4880 deg
Mean motion: 13.84180249 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17039
Checksum: 262

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93314.27490495
Element set: 816
Inclination: 98.8528 deg
RA of node: 336.2622 deg
Eccentricity: 0.0014224
Arg of perigee: 264.8255 deg
Mean anomaly: 95.1288 deg
Mean motion: 14.01329924 rev/day
Decay rate: 3.52e-06 rev/day^2
Epoch rev: 16304
Checksum: 314

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93314.40511387
Element set: 710
Inclination: 82.5262 deg
RA of node: 320.0564 deg
Eccentricity: 0.0012856
Arg of perigee: 307.6374 deg
Mean anomaly: 52.3617 deg
Mean motion: 13.83563412 rev/day
Decay rate: 4.0e-07 rev/day^2
Epoch rev: 15750

Checksum: 269

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93311.55017164
Element set: 613
Inclination: 82.5434 deg
RA of node: 326.2919 deg
Eccentricity: 0.0013431
Arg of perigee: 27.8915 deg
Mean anomaly: 332.2926 deg
Mean motion: 13.16456437 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12219
Checksum: 275

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93308.09045315
Element set: 815
Inclination: 98.6458 deg
RA of node: 335.5750 deg
Eccentricity: 0.0012543
Arg of perigee: 165.4607 deg
Mean anomaly: 194.6943 deg
Mean motion: 14.22328054 rev/day
Decay rate: 1.89e-06 rev/day^2
Epoch rev: 12852
Checksum: 306

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93313.85451209
Element set: 611
Inclination: 82.5506 deg
RA of node: 271.6301 deg
Eccentricity: 0.0014550
Arg of perigee: 26.1377 deg
Mean anomaly: 334.0477 deg
Mean motion: 13.16825241 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10759
Checksum: 276

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93314.66191362
Element set: 210
Inclination: 82.5507 deg
RA of node: 19.6100 deg
Eccentricity: 0.0023265

```
Arg of perigee: 115.4347 deg
Mean anomaly: 244.9226 deg
Mean motion: 13.82991020 rev/day
Decay rate: 9.3e-07 rev/day^2
Epoch rev: 988
Checksum: 282

/EX
```

336. ORBS$316.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 18:41:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-316.m.1993@ampr.org>
Source record: 28596
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-316.M
Orbital Elements 316.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX November 12, 1993
BID: $ORBS-316.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93314.97077396
Element set: 572
Inclination: 51.6183 deg
RA of node: 202.0455 deg
Eccentricity: 0.0005693
Arg of perigee: 23.2148 deg
Mean anomaly: 336.9078 deg
Mean motion: 15.59529397 rev/day
Decay rate: 4.226e-05 rev/day^2
Epoch rev: 3054
Checksum: 314

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93307.41913862
Element set: 359
Inclination: 28.4692 deg
RA of node: 246.8298 deg
Eccentricity: 0.0004679
Arg of perigee: 70.9135 deg
Mean anomaly: 289.1966 deg
Mean motion: 14.92902547 rev/day
Decay rate: 9.06e-06 rev/day^2
Epoch rev: 19233
Checksum: 335

Satellite: GRO
Catalog number: 21225
Epoch time: 93314.39830284
Element set: 220
Inclination: 28.4634 deg
RA of node: 313.5049 deg
Eccentricity: 0.0075239
Arg of perigee: 9.9355 deg
```

Mean anomaly: 350.2723 deg
Mean motion: 15.58504747 rev/day
Decay rate: 1.6953e-04 rev/day^2
Epoch rev: 2313
Checksum: 290

Satellite: UARS
Catalog number: 21701
Epoch time: 93309.31219655
Element set: 411
Inclination: 56.9841 deg
RA of node: 336.0504 deg
Eccentricity: 0.0005602
Arg of perigee: 88.9850 deg
Mean anomaly: 271.1633 deg
Mean motion: 14.96217444 rev/day
Decay rate: -2.650e-05 rev/day^2
Epoch rev: 11741
Checksum: 279

Satellite: POSAT
Catalog number: 22829
Epoch time: 93289.11726978
Element set: 204
Inclination: 98.6763 deg
RA of node: 2.0610 deg
Eccentricity: 0.0010043
Arg of perigee: 184.4594 deg
Mean anomaly: 175.6498 deg
Mean motion: 14.27975951 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 286
Checksum: 317

/EX

337. ORBS$316.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-15 18:43:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-316.n.1993@ampr.org>
Source record: 28597
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-316.N
2Line Orbital Elements 316.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX November 12, 1993
BID: $ORBS-316.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93304.58449144 -.00000081 00000-0 10000-3 0 2086
2 14129 27.1748 358.4423 6020940 126.4893 305.1053 2.05881853 78069
UO-11
1 14781U 84021B 93313.58249069 .00000229 00000-0 42927-4 0 6110
2 14781 97.7981 333.4777 0010810 254.3694 105.6328 14.69080500518069
RS-10/11
1 18129U 87054A 93314.04939054 .00000017 00000-0 11670-4 0 8119
2 18129 82.9214 130.8225 0010360 275.4234 84.5738 13.72325356319844
AO-13
1 19216U 88051B 93313.91272759 -.00000211 00000-0 10000-4 0 8126
2 19216 57.8912 284.9332 7213964 328.0558 3.5561 2.09724845 41418
FO-20
1 20480U 90013C 93310.07362541 -.00000005 00000-0 14874-4 0 6071
2 20480 99.0217 139.2984 0541030 125.0547 240.2545 12.83221816175512
AO-21
1 21087U 91006A 93314.29055835 .00000084 00000-0 82657-4 0 3674
2 21087 82.9398 304.7020 0035176 337.0887 22.8703 13.74528243139502
RS-12/13
1 21089U 91007A 93313.61484132 .00000056 00000-0 53208-4 0 6119
2 21089 82.9251 174.2800 0030580 1.6907 358.4344 13.74029689138495
ARSENE
1 22654U 93031B 93312.79592387 -.00000046 00000-0 10000-3 0 2081
2 22654 1.4077 114.0599 2932748 160.6003 214.5238 1.42203069 2633
UO-14
1 20437U 90005B 93314.26240544 .00000128 00000-0 57654-4 0 9113
2 20437 98.6068 36.8706 0011455 111.4215 248.8190 14.29802927198303
AO-16
1 20439U 90005D 93314.25650448 .00000093 00000-0 43829-4 0 7110
```

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2 20439 98.6135 37.8762 0011873 112.5374 247.7066 14.29859897198314
DO-17
1 20440U 90005E 93314.72182474 .00000108 00000-0 49637-4 0 7113
2 20440 98.6156 38.5937 0011919 110.1078 250.1390 14.29997154198392
WO-18
1 20441U 90005F 93314.27363549 .00000092 00000-0 43527-4 0 7123
2 20441 98.6152 38.1661 0012426 111.7995 248.4510 14.29974899198337
LO-19
1 20442U 90005G 93314.26623889 .00000107 00000-0 48991-4 0 7115
2 20442 98.6160 38.3657 0012902 111.6029 248.6529 14.30067157198345
UO-22
1 21575U 91050B 93313.78644466 .00000117 00000-0 46604-4 0 4111
2 21575 98.4598 27.4629 0006935 224.2634 135.7989 14.36863544121573
KO-23
1 22077U 92052B 93314.21490842 .00000000 00000-0 10000-3 0 3084
2 22077 66.0804 18.4482 0004639 338.0608 22.0210 12.86281812 58628
AO-27
1 22825U 93061C 93305.38322237 .00000057 00000-0 31218-4 0 2082
2 22825 98.6783 18.2116 0008754 149.2634 210.9045 14.27587035 5170
IO-26
1 22826U 93061D 93305.66096033 .00000076 00000-0 39017-4 0 2093
2 22826 98.6791 18.4934 0009019 149.5441 210.6266 14.27689613 5227
KO-25
1 22830U 93061H 93314.69145093 .00000111 00000-0 52532-4 0 2112
2 22830 98.5800 27.0255 0012337 94.9544 265.3046 14.28015541 6518
NOAA-9
1 15427U 84123A 93300.72651427 .00000099 00000-0 62608-4 0 6087
2 15427 99.0865 343.0970 0014906 151.8994 208.2999 14.13555759457494
NOAA-10
1 16969U 86073A 93308.02577200 .00000107 00000-0 53892-4 0 5086
2 16969 98.5151 318.8770 0012448 270.5362 89.4395 14.24841200370532
MET-2/17
1 18820U 88005A 93313.86326152 .00000060 00000-0 48384-4 0 2105
2 18820 82.5401 83.0499 0017920 77.7053 282.6113 13.84696783292003
MET-3/2
1 19336U 88064A 93313.98312645 .00000043 00000-0 10000-3 0 2102
2 19336 82.5385 118.8020 0017396 88.4059 271.9055 13.16962219254409
NOAA-11
1 19531U 88089A 93307.95823027 .00000139 00000-0 84844-4 0 4080
2 19531 99.1482 286.6377 0012789 46.5585 313.6658 14.12928630263406
MET-2/18
1 19851U 89018A 93314.44174536 .00000042 00000-0 31952-4 0 2111
2 19851 82.5186 318.3186 0015511 116.9458 243.3286 13.84348503237428
MET-3/3
1 20305U 89086A 93313.78275180 .00000043 00000-0 10000-3 0 9124
2 20305 82.5475 62.1477 0016698 110.3082 249.9836 13.16023732194255
MET-2/19
1 20670U 90057A 93314.71352062 .00000015 00000-0 79036-5 0 7110
2 20670 82.5501 22.0091 0017060 42.7604 317.4880 13.84180249170390
FY-1/2
```

```
1 20788U 90081A 93314.27490495 .00000352 00000-0 25587-3 0 8161
2 20788 98.8528 336.2622 0014224 264.8255 95.1288 14.01329924163048
MET-2/20
1 20826U 90086A 93314.40511387 .00000040 00000-0 31266-4 0 7107
2 20826 82.5262 320.0564 0012856 307.6374 52.3617 13.83563412157505
MET-3/4
1 21232U 91030A 93311.55017164 .00000043 00000-0 10000-3 0 6133
2 21232 82.5434 326.2919 0013431 27.8915 332.2926 13.16456437122196
NOAA-12
1 21263U 91032A 93308.09045315 .00000189 00000-0 93717-4 0 8155
2 21263 98.6458 335.5750 0012543 165.4607 194.6943 14.22328054128523
MET-3/5
1 21655U 91056A 93313.85451209 .00000043 00000-0 10000-3 0 6115
2 21655 82.5506 271.6301 0014550 26.1377 334.0477 13.16825241107591
MET-2/21
1 22782U 93055A 93314.66191362 .00000093 00000-0 79632-4 0 2106
2 22782 82.5507 19.6100 0023265 115.4347 244.9226 13.82991020 9889
MIR
1 16609U 86017A 93314.97077396 .00004226 00000-0 55300-4 0 5720
2 16609 51.6183 202.0455 0005693 23.2148 336.9078 15.59529397 30542
HUBBLE
1 20580U 90037B 93307.41913862 .00000906 00000-0 78090-4 0 3593
2 20580 28.4692 246.8298 0004679 70.9135 289.1966 14.92902547192330
GRO
1 21225U 91027B 93314.39830284 .00016953 00000-0 18182-3 0 2202
2 21225 28.4634 313.5049 0075239 9.9355 350.2723 15.58504747 23130
UARS
1 21701U 91063B 93309.31219655 -.00002650 00000-0 -22264-3 0 4119
2 21701 56.9841 336.0504 0005602 88.9850 271.1633 14.96217444117417
POSAT
1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
/EX
```

338. STS-Plus

Newsgroup: rec.radio.amateur.space
Date: 1993-11-17 17:34:25 UTC
From: cbr600@nbc.ksu.ksu.edu
Message-ID: <2cdnb1INNcg@nbc.ksu.ksu.edu>
Source record: 28598

I recently bought the STS-Plus sattelite tracking program, and I was wondering if anyone else out there uses this program...Also, is there any way that the program will tell you when a good pass is going overhead??? One more thing. If anyone out there has an up to date listing of all the sattelites carrying Ham Radio signals with the uplinks and downlinks, this would also be greatly appreciated.

Replies via E-mail please. I don't read this group very often.

Tnx.

73's DE


```
-------------------------------------------------------------------------------
| |\ | .----/ \ / /\ \ / | Jeremy Utley |
| | \ | | /| \ / /__\ \/ | 1400 Univ. DR.|
| | \ | | / | | / \ /\ | Manhattan, KS |
| | \| `-/--' | / \ / \ | 66502 |
-------------------------------------------------------------------------------
Internet:cbr600@matt.ksu.ksu.edu Bitnet:cbr600@ksuvm Packet:N0YAX@N0OER.KS.USA
---------------------------STANDARD DISCLAIMERS APPLY-------------------------
```

339. AMSAT Orbital Elements

Newsgroup: rec.radio.amateur.space
Date: 1993-11-18 06:39:29 UTC
From: dab@kaiwan.com
Message-ID: <CGoD5t.8ou@kaiwan.com>
Source record: 28599

I know the AMSAT Orbital elements are posted weekly on this topic, but does anybody know an FTP site where the latest elements are always available?

TNX & 73 de Doug - NF6H

--
//////////////////////////////////////
Doug Brandon [NF6H]
dab@kaiwan.com Placentia, California

340. Satellites and Frequencys

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 02:37:14 UTC
From: cbr600@nbc.ksu.ksu.edu
Message-ID: <2chbgqINN7vt@nbc.ksu.ksu.edu>
Source record: 28600

I thought some of the newer hams would appreciate this. I just went into our campus library and looked this up in the April 93 issue of QST, page 94. If anyone has any additions to this, they can E-Mail me and I'll add them and post a comptlete listing at a later date.

SSB/CW: Uplink (MHz) Downlink (MHz)

Amsat-Oscar 10 435.027-435.179 145.825-145.977

RS-10/11 145.860-145.900 29.360- 29.400

RS-12/13 21.210- 21.250 29.410- 29.450

Amsat-Oscar 13 435.423-435.573 145.825-145.975
144.423-144.473 435.990-435-940
1269.351-1269.641 435.715-436.005
435.601-435.637 2400.711-2400.747

Fuji-Oscar 20 145.900-146.000 435.900-435.800
Note: Fuji-Oscar 20 Wednesdays only

Amsat-Oscar 21 435.102-435.022 145.852-145.932
435.123-435.043 145.866-145.946

1200 bit/s Packet
FM FSK uplink, PSK SSB downlink, except as noted.

Amsat-Oscar 16 145.900 145.940 437.05/437.026
145.920 145.960

Dove-Oscar 17 None 145.825/2401.22
Note: Telemetry only; 2-meter FM FSK downlink is not operational.

Webersat-Oscar 18 None 437.10
Note: Telemetry and images only

Lusat-Oscar 19 145.84 145.88 437.126
145.86 145.90

Fuji-Oscar 20 145.85 145.89 435.910
145.87 145.91

Mir Space Station 145.55 145.55
Note: Packet mailbox; 1200 bit/s FM FSK Simplex.

9600 bit/s Packet
FM FSK uplink, FM FSK Downlink

UoSat-Oscar 22 145.900 145.975 435.120
Note: Onboard camera

KitSat-Oscar 23 145.850 145.900 435.175
Note: Onboard cameras

FM Voice

Amsat-Oscar 21 435.016 145.987
Note: In repeater mode 6 minutes out of every 10.

Mir Space Station 145.55 145.55
Note: Occasional simplex QSO's with the cosmonauts.

This represents the most complete list I could get with my photocopy of the article...I do know that one of the downlink freq. for LUSAT-Oscar 19 is missing, and I will attempt to correct this with the next posting. As I said before, all additions and changes are asked for, and a more up-to-date posting will follow later. Hope you enjoy this!!!!!

73 DE N0YAX
Jeremy Utley
cbr600@matt.ksu.ksu.edu (Internet)
cbr600@ksuvm (Bitnet)
BXTH85A (Prodigy)

341. SPACE TRIVIA LIST UPDATE - 19th November, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 12:09:33 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Nov19.120933.1675@scorch.apana.org.au>
Source record: 28601
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

We're back! Sorry about the delay folks, but this was due
mainly to my excruciating workload for the past few months. I let
even the reminders lapse so we haven't had much new Trivia for awhile,
although last weeks reminder prompted a few messages. They'll appear
in the next update.

I'm posting the full list with this update, just to remind you
how many items we have collected now. I would appreciate corrections
of any kind and SUBMISSIONS galore!

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

```
*****************************************************************************
*****************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
*****************************************************************************
*****************************************************************************
```

(269) The remotest object visible with the naked eye is the great galaxy
in Andromeda known as Messier 31.

[Guiness Book of Records, 1992 Softcover edition.]

(270) The first double quasar (0957+56) among 1500 known quasars was announced in May 1980.
[Guiness Book of Records, 1992 Softcover edition.]

(271) The Nearest star to Earth, excepting the Sun, is the very faint Proxima Centauri, discovered in 1915, which is about 4.225 light years away.
[Guiness Book of Records, 1992 Softcover edition.]

(272) The nearest star visible to the naked eye is the binary Alpha Centauri or Rigel Kentaurus at 4.35 light years distant.
[Guiness Book of Records, 1992 Softcover edition.]

(273) The Alpha Centauri binary will reach a minimum distance from Earth of 2.84 light years in the year 29700 AD.
[Guiness Book of Records, 1992 Softcover edition.]

(274) The present distance of the Solar System from the centre of the Milky Way galaxy is 27 700 light years and it will reach a minimum distance of 27 600 light years (perigalacticon) in about 15 million years' time.
[Guiness Book of Records, 1992 Softcover edition.]

(275) The AVERAGE velocity of the Sun and nearby stars has been calculated to be 792 000km/h. However, the Sun's actual velocity is 97 200km/h faster than this average.
[Guiness Book of Records, 1992 Softcover edition.]

(276) The largest known star is Betelgeux at 310 light years distance, and is 500 times larger than the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(277) The heaviest known star is Eta Carinae, 9100 light-years distant in the Carinae Nebula in our own Galaxy. It has a mass some 200 times our own Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(278) The smallest known star appears to be the White Dwarf L362-81 with an estimated diameter of only 5600 km.
[Guiness Book of Records, 1992 Softcover edition.]

(279) The lightest and dimmest known star is RG 0058.8-2807, with a mass of only 0.014 that of our Sun, and a total luminosity of only 0.0021 that of the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(280) The brightest Supernova ever seen by historic Man is believed to be SN 1006, noted in April 1006 near Beta Lupi. It f;ared for two years and attained a magnitude of -9 to -10!
[Guiness Book of Records, 1992 Softcover edition.]

(281) The largest constellation is Hydra which covers 6.3% of the
hemisphere and contains 68 naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(282) The constellation Centaur, ranking 9th in area, has at least 94
naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(283) The smallest constellation is Crux Australis with an area of only
0.16% of the whole sky.
[Guiness Book of Records, 1992 Softcover edition.]

****
****
* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
* *
****
****

****
****
* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting in the launch pad gantry. Does anyone know if this is true and if so which launch ? (According to the guide on a KSC coach tour - probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to launch leeches - 'the world's most ideal space travellers' - on an extended flight.
"Give them a bloody meal before they go, and they'll need nothing for a year-and-a-half!" was how one scientist characterized the suitability of leeches for space travel. Posing no feeding or waste disposal problems, leeches might even breed en-route - providing researchers with a useful insight into the genetic side-effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first Moonwalker. In 1963, his place in the history books was under seige from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard had broken the world's land speed record in a rocket propelled sled, and had been banned from playing noughts-and-crosses with visitors because he usually won!
The chances are that if a monkey had been selected to fly to the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a study was conducted into the viability of employing a 'vacuum cleaner' type device in Low-Earth orbit to collect some of the particles of Moonrock (tectites) that are dislodged from the lunar surface by annual meteorite showers and sometimes find their way to the Earth's surface.
Collected in orbit and returned to Earth by parachute, samples gathered in this way would be free from the contamination caused by passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true? 1978-1986 the rumor was that if ejected at 100 Kft then you would drift up to 200 Kft before falling back. During the fall, the aero heating would become so intense that helmet melting would be likely. I'd love to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(Can anyone come up with some sources for backing up/refuting the last three items?)

****

=-=

Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au

=-

342. SPACE TRIVIA LIST - 19th November, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 12:13:35 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Nov19.121335.1781@scorch.apana.org.au>
Source record: 28602
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# #
# SPACE TRIVIA LIST #
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Masterminded by:- THE NEWCASTLE SPACE FRONTIER SOCIETY
Temporarily Moderated by:- Luke Plaizier

PLEASE DIRECT YOUR SUBMISSIONS TO:-

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This is the list of Trivia information recorded in just over 25 years
of human activity in space. In no way is this an official list of events nor
is it guaranteed that all information included in this file is accurate or
true.
This file has come about due to the happy donations of time and
information of people on the internet located at various sites world wide,
and represents a collection of information that many of them have either
found interesting themselves, or would otherwise believe that other people
might find interesting.
The MOST important thing about this is that we'd like it to be built
by the input of many people, so if you can

PLEASE DONATE SOME TRIVIA AND WE WILL ENDEAVOUR TO ENSURE THAT IT
IS INCLUDED IN THIS FILE.

Submission details are included in the trailer to this list.

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* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
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****

(1) Even though Yuri Gagarin, on the first manned spaceflight, ejected
from his Vostok capsule just before landing, the official Soviet
report said otherwise for fear that the rest of the world might
not recognise the mission as a complete success.
(1a) The Federation Aeronautic International, the governing body for
aerospace records has rules specificially stating that the pilot
must be in control of the craft from take-off to landing. Vostok
cosmonauts ejecting clearly violated the rule so it was hidden.
See my book "Almanac of Soviet Manned Space Flight" for details.
Available from Zenith Books 800-826-6600.
[From dennisn@ecs.comm.mot.com]

(2) Radio frequencies in interstellar space between 1420 and 1720 MHz
are known as 'the water hole', as it is thought that alien
civilisations might converge and commune in radio frequencies
in this band of 300MHz. (1420 = Emission line of neutral
Hydrogen, 1720=same for Hydroxyl and together these two make
water.) [BIS, SPACEFLIGHT, Vol. 35, No. 4]

(3) In one day, SETI searchers at Puerto Rico and California, using
the new Targeted Search's Multi Channel Spectral Analyzer,
sifted through more information than had been collected on all
previous SETI efforts combined.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(4) Silicon Engine's new Targeted Search's Multi Channel Spectrum
Analyzer, developed for a 10 year NASA-funded SETI, is capable
if listening in on some 15million frequency channels, some
with a bandwidth of as little as 1Hz.
[BIS, SPACEFLIGHT, Vol. 35, No. 4]

(5) The engines of the escape tower on the Apollo moon missions (on top of
the mighty Saturn V) were more powerful than the entire Redstone
launcher that put the first American into sub-orbital space.
[Paul.Keinanen@Telebox.tele.fi, steven@spri.levels.unisa.edu.au]
(5a) The Apollo LES (Launch Escape System) thrust was 654 kN, while the
Mercury-Redstone thrust was 347 kN. The Apollo CM mass was about 5800
kg and the LES mass was 4000 kg or about 10000 kg combined. The
accelleration would be about 65 m/s/s or about 6.5 G. As the maximum
accelleration during ascent for Apollo-Saturn V was about 4 G,
the CM+LES combination could still be separated, even if
the Saturn V engines would still be running at full thrust.
(5b) The engines on the Launch Escape Tower (LES) of the Saturn V are
indeed more powerful than the engines used on the Mercury-Redstone

booster. From [1], the LES has a thrust of at least 654 kN (147 klbf)
(Another figure of 689 kN (155 klbf) is also mentioned in [1]. The lower
figure may be the total downwards thrust since the engines have to
point at an angle to avoid burning up the Command Module if used.)
The Mercury-Redstone has a thrust of 347 kN (78 klbf) [2].
[1] M. Wilson, "Moon landing," Flight International, pp. 208-221,
6 Feb. 1969.
[2] K. Gatland, "The illustrated encyclopedia of space technology,"
Landsdowne Press, Sydney, 1981.

(6) March 19, 1959
"The Dept. of Defense announces that three atomic blasts were
detonated in space during 1958 as part of Project Argus using modified
X-17 rockets."
[-Eugene Emme, ed., _Aeronautics and Astronautics, p. 107.]

(7) LENGTH WARNING. This one is VERY large....
Hey, I don't know if you'll include this in your list of trivia but
it surely is amusing. After each launch countries are required by
treaty to announce the launch. There are no requirements about what
the contents of the announcement are. Shown below is a Chinese
announcement from 1975. It is mostly propaganda. Did you know that
launching a satellite refutes Confucius?
(Actual transcript has been shortened for space considerations.)

((TEXT) PEKING, DECEMBER 17, 1975 (HSINHUA) -- CHINA
SUCCESSFULLY LAUNCHED ANOTHER MAN-MADE EARTH SATELLITE ON

DECEMBER 16, 1975, UNDER THE GUIDANCE OF CHAIRMAN MAO'S
REVOLUTIONARY LINE, ON THE BASIS OF THE VICTORY IN THE
GREAT PROLETRAIAN CULTURAL REVOLUTION AND THE MOVEMENT
TO CRITICIZE LIN PIAO AND CONFUCIUS, AND IN THE EXCELLENT
SITUATION CHARACTERIZED BY CONSISTENT NEW VICTORIES IN
THE SOCIALIST REVOLUTION AND SOCIALIST CONSTRUCTION.
THE SATELLITE IS FUNCTIONING NORMALLY.
THE SUCCESSFUL LAUNCHING OF THE SATELLITE IS A NEW
ACHIEVEMENT MADE BY THE PEOPLE OF THE WHOLE COUNTRY,
UNDER THE LEADERSHIP OF THE PARTY CENTRAL COMMITTEE
HEADED BY THE GREAT LEADER CHAIRMAN MAO, IN TAKING CLASS
STRUGGLE AS THE KEY LINK, CONTINUOUSLY CONSOLIDATING
AND DEVELOPING THE FRUITS OF THE GREAT PROLETARIAN
CULTURAL REVOLUTION, AND FIRMLY CARRYING OUT THE SERIES
OF IMPORTANT INSTRUCTIONS OF CHAIRMAN MAO'S INCLUDING
THOSE ON STUDYING THE THEORY AND COMBATING AND PREVENTING
REVISIONISM, ON PROMOTING STABILITY AND UNITY AND ON
PUSHING THE NATIONAL ECONOMY FORWARD. IT IS A FRESH
SUCCESS ACHIEVED BY ADHERING TO THE PRINCIPLE OF
INDEPENDENCE AND SELF-RELIANCE, BRINGING INTO FULL PLAY
THE INITIATIVE OF BOTH THE CENTRAL AND LOCAL AUTHORITIES,
UNIFYING PLANNING, WORKING ENGERGETICALLY IN CLOSE
COORDINATION, WAGING A UNITED STRUGGLE AND GRASPING

REVOLUTION, PROMOTING PRODUCTION AND OTHER WORK AND
PREPAREDNESS AGAINST WAR.
THE CENTRAL COMITTEE OF THE COMMUNIST PARTY OF CHINA,
THE STATE COUNCIL AND THE MILITARY COMMISSION OF THE
CCP CENTRAL COMMITEE EXTEND WARM CONGRATULATIONS
TO THE WORKERS, COMMANDERS AND FIGHTERS OF THE PEOPLE'S
LIBERATION ARMY, SCIENTIFIC WORKERS, ENGINEERS AND
TECHNICIANS, REVOLUTIONARY CADRES AND MILITIAMEN WHO
HAVE BEEN ENGAGED IN THE RESEARCH, MANUFACTURE AND LAUNCHING
OF THE SATELLITE AND OTHER PEOPLE CONCERNED. 170110 UTT NY 17/O1224Z

(8) Neil Armstrong and Buzz Aldrin, the first men on the moon, almost
crashed onto the lunar surface. The Eagle's descent engine had
about 10 seconds of fuel left when they landed.
[From yantosca@bu.edu]
(8a) "The Eagle had landed on a countdown to abort, primarily because
propellants were sloshing away from intakes and meters, giving off
readings that the ship had entered the dead-man zone with its tanks
running dry."
[Submitted by davem@ee.ubc.ca, clarifying that although correct at
the time, post-flight analysis uncovered this problem, meaning
incorrect readings from the meters.]

(9) The maiden launch of the first Space Shuttle, "Columbia", occurred
on April 12, 1981, 20 years to the day of Yuri Gagarin's "Vostok"
flight.
[From yantosca@bu.edu]

(10) In 1963, the Soviet Union tried to launch a rocket (from Baikonur??)
but the main engine didn't fire. Several technicians were dispatched
to the launch pad to correct the problem, under the command of an
engineer/officer whose last name was Nedelin. Somehow, the
second stage engine fired, causing a massive explosion while the men
were still on the launch pad. It is estimated that more than 100 of
the Soviet Union's best rocket engineers and technicians (including
Nidelin) perished on that day. Ironically, there was one survivor;
he ducked into a fireproof box on the launch pad to smoke a cigarette
and was shielded from the blast. The loss of so many engineers and
technicians was a serious setback to the Soviet Space program; this
may have been one of the reasons why the Soviets did not reach the
Moon before NASA did.
[From yantosca@bu.edu, sourced from "AIR & SPACE / Smithsonian"]
(10a) The best account to date is in Rabochna Ya Tribuna, Dec. 6, 1990, p.4
"Top Secret: Explosion at Baykonur Cosmodrome: Only after 30 years are
we learning the truth about the death of Marshal Nedelin and a large
group of rocket speciallists", FBIS-UPS-91-002 from NTIS.
The author says numbers are still not known but range from 165
to 200 deaths. Happened Oct. 24 1960, Nedelin was the head of the
Strategic Rocket Forces (all ICBMs, launch crews, etc..). More than
one person survived, the rumor of the one survivor is that it was
Cheif Designer S Korolev, but this is unlikely. But it was not

his rocket design and he should have had no reason to be there. The cause is speculated to be the failure of circuit isolation during electrical testing actually sent the signal for the 2nd stage of the SS-7 to fire after repairs were made. The reference above has a good account of the fire by a man who was blown 30 meters by the blast and survived. Flim of the fire is available.
*NOTE: We'd like to thank the poster of this submission for his quick response for our request for more information.

(11) This is actually several combined into one, as they are from the same source. They are fact, but the exact source is unknown at the moment. Further SSME details have become available, and are located as items 149 - 160. Anyone with information as to the source of confirmation or denial of the following items, please direct email to the moderator.
(a) 2 SSME's could generate as much power as that used by a NIMITZ class aircraft carrier.
(b) The Fuel and Oxygen pumps of 3 SSME's combined could generate as much power as that used by the battleship IOWA plus 12 ETHAN class submarines.
(c) The combustion in 3 SSMEs combined, to make one shuttle flight system, releases more energy than the combined nuclear power plants of 9 non-US countries. (but which ones?)
(d) The turbo-pumps on the SSME rotate at 37,000 rpm. Formula One engines can rotate at up to 15,000 rpm. A standard 1990's vintage motor vehicle is very lucky to rev to 10,000rpm.
[PLEASE SEE ITEMS 149-160 FOR FURTHER SSME ITEMS]

(12) The LOX turbopumps on the F-1 engines of the Saturn V booster delivered 24,811 gallons of LOX per minute. They could have filled a swimming pool 25 feet long, 10 feet wide, and 6 feet deep in about 27 seconds. (In metric, the pumping rate is about 94,000 liters per minute, and the example swimming pool is 7 meters long, 3 meters wide, and 2 meters deep. The 27 seconds stays the same.)
[Source: "Apollo: The Race To The Moon", Charles Murray and Catherine Bly Cox, Simon and Schuster, New York, 1989, ISBN 0-671-61101-1, submitted by gbt@zia.cray.com]

(13) (This one is specific to 1993) Although june 21, the summer solstace in the Northern hemisphere is the longest period of daylight, July 1 was the longest day of the year worldwide! That is because at Z 00.00 (midnight world standard time) a leap second was added making July 1 24h00m01s long.....the longest day of the year!
[jbear@telerama.pgh.pa.us]

(14) Astronaut charm school included teaching the boys what socks to wear with which pants and shoes.
[mark.blevis@qmail.dgrc.doc.ca]

(15) After the first spacewalk, the Voshkod capsule carrying Alexei Leonov and Pavel Belyayev went off course and came down in the middle of a forest in Siberia. The two cosmonauts spent the night waiting for

rescue in the snow, huddled around a fire in their spacesuits,
listening nervously to wolves howling in the woods around them.
[Reference: Several sources, notable James Oberg's `Red Star in Orbit'
From alien@acheron.amigans.gen.nz]

(16) "A typical Perseid meteoroid that produces a visible meteor of
magnitude 2.5 has a mass of around *2.5 milligrams* and a velocity of
order *60 kilometres per second*. Such a meteoroid would inflict
severe damage - a crater of 5 cm diameter has been estimated - if it
struck an artificial satellite."
[RANDALLJC@UK.AC.PORTSMOUTH.CSOVAX]

(17) The Apollo 13 moon mission was launched precisely on schedule, 13:13
Houston time, April 11, 1970. On April 13th, en-route to the moon,
an oxygen tank in the service module exploded. The crew got home
safely thanks to the consumables and propulsion of the LM, and the
ingenuity of ground controllers in improvising LM lifeboat procedures.
The S-IVB stage which boosted the mission into translunar trajectory
was delivered to Kennedy Space Center on June 13, 1969--Friday.
[Apollo Expeditions to the Moon, NASA SP-350, Chapter 13; Stages to
Saturn, NASA SP-4206. From kelvin@autodesk.com]

(18) For a Motor Vehicle Engine to have the same power-to-weight ratio
as one Space Shuttle Main Engine, then it would only have to be the
size of your clenched fist. [SHUTTLE, Nigel MacKnight.]

(19) The Liquid Hydrogen Turbo-Pumps on a Space Shuttle Main Engine weigh
as much as a standard V8 Motor Vehicle engine, but output some 310
times the power. (See also item 150) [SHUTTEL, Nigel MacKnight.]

(20) The Apollo 12 moon mission in 1969, following closely on the heels of
the Apollo 11 mission, was struck by a bolt of lightning just after
it left the launch pad.
[SHUTTLE, Nigel MacKnight.]
(20a) Atlas-Centaur AC-67, launched on March 26, 1987, was hit by
lightning and started to deviate from its planned course some
49-seconds after lift-off. Range Safety officials destroyed the
vehicle.
[Space Flight News, May 1987]
{If anyone has record of any-other lightning strike, then let
us know because it belongs here!}

(21) The VAB, where Space Shuttle components are assembled today, and
Saturn V components were assembled in the 60's and 70's,
occupies a ground area of 8 acres and boasts an internal
volume of 3,624,000 cubic metres (129,428,000 cubic feet!)
The structure was designed to withstand winds of 200km/h
(125 mph) and has a foundation that rests on more than 4200
steel pilings 40 cm (16 in) in diameter that each go to a
depth of 49 metres (160 ft) through bedrock. The building
has its own internal weather!
[SHUTTLE, Nigel MacKnight.]

(22) There was an aluminium shed near launch pad 39A. It was roughly
50 yards away from the perimeter. It was a prefab
building and it wasn't determined whether it would stand up
to the first launch of the shuttle or not. After the first
launch of Columbia, the shed was reduced to a few pieces
of debris scattered across the ground.
[SHUTTLE, Nigel MacKnight.]

(23) Noticeboard of Safety requirements inside the VAB:-
REMOVE PERSONAL ITEMS FROM THE UPPER POCKETS. WEAR BADGES
INSIDE SHIRT OR CARRY IN PANTS POCKET. REMOVE WATCHES AND
RINGS OR TAPE SAME. EYEGLASSES MUST BE TETHERED. ACCESS
RESTRICTED WITHIN THREE FEET OF VEHICLE-CONTACT ACCESS
CONTROL MONITOR. FOOD AND BEVERAGES PROHIBITED. FLAMMABLE
LIQUIDS MUST BE APPROVED. NO HARD HATS ALLOWED.
[SHUTTLE, Nigel MacKnight.]

(24) I worked at the Johnson Space Center, and during a material testing
procedure on Space Suit Assemblies I got to play with a heat-soaked
shuttle tile cube. It was a one-inch cube, and it was soaking in an
oven at about 1400F. We took it out of the oven with tongs and then
you could hold it by the edges, preferably the corners. You did not
want to touch the face of it - by minimizing the surface that you were
in contact with you could minimize the heat transfer.
It glows (visibly) just a little, but it sure shows up on
infrared Kokak slide film :-)
[From jgladu@bcm.tmc.edu]

(25) The Software programmes controlling the Shuttle's on-board computers
are the most sophisticated programmes ever developed for a
spacecraft, and contain over 500,000 IBM-written instructions. This is
twenty five times more than the programmes developed for the Saturn
launch vehicle which guided Apollo astronauts from launch, through
orbital insertion and into lunar trajectory.
[SHUTTLE, Nigel MacKnight.]

(26) John F. Kennedy Space Center, or KSC as it is more usually referred to,
is situated on Merritt Island. The operational areas are located
adjacent to Mosquito Lagoon. Visitors soon find out that the
lagoon did not receive its name frivolously, and that a reliable
brand of mosquito repellant can be worth its weight in gold!
[SHUTTLE, Nigel MacKnight.]

(27) And then there are the Alligators at KSC. Many of the 'gators have
become quite tame, and some have developed the habit of clambering
out of the pond in front of KSC's large canteen facility to 'beg'
for scraps of food from the office workers who eat their lunch
outside on the lawn.
[SHUTTLE, Nigel MacKnight.]
(27a) This is a big problem at KSC (Not "The Cape" as many call it...)
because alligators are REALLY stupid. They can't tell the difference
between a sandwich or your hand...In fact to them there IS no
difference. We are warned over & over in the "KSC bulletin" not to

feed them. Since KSC is a nature preserve, it is illegal to feed the 'gators. If caught, you can be disciplined. When the alligators lose their fear of humans, they are caught and moved to a remote part of the preserve. If they come back the alligators are killed. Period.
[From HOLLIS@TITAN.KSC.NASA.GOV]

(28) The oxygen tank of the External Tank of the Space Shuttle Transportation System occupies a small section at the front of the tank, whilst the Hydrogen Tank occupies the rest below it. The Hydrogen Tank is 2.5 times larger than the Oxygen tank, but weighs only one-third as much when filled to capacity. This difference comes about because liquid oxygen is some sixteen times more dense than liquid hydrogen.
[SHUTTLE, Nigel MacKnight.]

(29) The Crawler-Transporter, which carries the Space Shuttle, and previously the Saturn series of launch vehicles from the VAB to one of either launch pads 39A or 39B, is as wide as a 12 lane highway.
[SHUTTLE, Nigel MacKnight.]

(30) There are eight sets of tracks on each Crawler Transporter - two in each corner - and each set of tracks is comprised of fifty seven segments weighing one-ton apiece. That totals up to over 450 tons in track segments alone!
[SHUTTLE, Nigel MacKnight.]

(31) The Crawler Transporter isn't exactly good where fuel economy is concerned. Travelling at the rate of a mere 1 mile per hour, it guzzles fuel at the rate of of one gallon every twenty feet! Instead of Miles per Gallon, it is measured in Gallons per Mile!
[SHUTTLE, Nigel MacKnight.]

(32) On July 20, 1969, Houston Mission Control put through the longest-distance telephone call in history. It connected Richard Nixon to the two astronauts, Armstrong and Aldrin, on the surface of the moon.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(33) The Apollo Spacecraft, which carried astronauts to and from the Moon, had nearly two million working parts. A large Motor Vehicle has less than 3,000.
[The Young Scientists Book of Spaceflight. Rigby Usborne]

(34) Initially scheduled to be called "Constitution", the first Space Shuttle orbiter, OV-101, was renamed "Enterprise" in deference to "Star Trek" television series fans.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(35) There is another unknown orbiter in the Space Shuttle fleet. Tagged OV-098, the craft itself was named "Pathfinder". Its original role was as a rough dimension-and-weight mock-up for practising de-orbit operations on the run-way, and also to practise lifting and handling

the orbiter at various facilities (Shuttle Carrier Mate De-Mate,
VAB and OPF). The vehicle was heavily modified to eventually look
like the other orbiters for the "Great Space Shuttle Exposition"
scheduled for June 1983 to August 1984. The craft was returned to
MSFC and is on display today, with Filament wound boosters and
the tank used in the main propulsion tests (MPTA-ET) at the
Space and Rocket Center near Hunstville.
[Rockwell International Space Shuttle - Dennis R Jenkins]

(36) The Soviet Voskhod spacecraft, in follow-on to Vostok flights, was
essentially just a one-manned Vostok spacecraft. All three cosmonauts
launched in the spacecraft were without spacecsuits. Officially this
was reported to be because the Soviets were confident with the
spacecraft, but a quick calculation reveals that there would not
have been enough room for the three men if these spacesuits had been
included!
[The Soviet Manned Space Programme - Salamander Books]
(36a) The real trivia here I believe is the fact Korolevs engineers did
not want to make the modification believing it a bad idea, then
Korolev offered to fly one of the engineers on the first flight
and they accepted the mission, Feoktistov was the lucky engineer.
This was really part of Korolevs plans to get speciallists into
space to learn and stop all flights from being all military
pilots. Journalists were also selected for Voskhod missions.
[dennisn@comm.mot.com (Dennis Newkirk)]
(36b) This was repeated with Soyuz, stuffing three people without pressure
suits into a spacecraft designed for two with suits, resulting in the
deaths of the Soyuz-11 crew when the spacecraft vented its atmosphere
during reentry. After that all crews have worn pressure suits even
when (from Soyuz-12 to T-5) this reduced the crew size from three to
two.
[Mark Grant <mark@isltd.insignia.com>]

(37) The Soyuz spacecraft was initially designed by the Soviets for their
attempt at getting to the Moon before the Americans. But the orbital
Module of the Soyuz spacecraft was missing one vital component -
a transfer tunnel in the docking adapter. If it ever became necessary
to transfer crew or equipment to a Lunar orbiter or Lander, then
cosmonauts would have had to climb into suits and go into the
vacuum of space! The docking tunnel was added for later space-station
operations.
[The Soviet Manned Space Programme - Salamander Books]
(37a) The lunar module docking drouge was just a metal honeycomb type
crushable receptical for the LOK (lunar Soyuz) probe which just plunged
into the material and hung on. It was only used once per mission anyway.
[dennisn@comm.mot.com (Dennis Newkirk)]

(38) The EDO (Extended Duration Orbiter) toilet is indeed different from a
standard shuttle toilet. The standard shuttle toilet has a bowl that
is used to contain fecal wastes. The waste material is freeze dried
when it enters the bowl. The current toilet is able to support flights

of up to 13 to 14 days. Modifications to the toilet are expected to increase this to about 16 days. The EDO toilet (This is the one making all the headlines about cost overruns) has just had the qualification unit complete its second flight. The 23 million dollars only produced a qualification unit. NASA has not purchased any actual flight units yet. The EDO toilet is different in that in place of the bowl there is a canister that is used to collect fecal wastes. Each canister can support 23 to 27 uses depending on what else the crew throws down there. When the canister fills up, it is replaces with a fresh canister. The drawbacks to this toilet are that the canisters require a lot of storage space that is not required by the standard toilet. The standard toilet has been in use since STS-1, while the EDO toilet is undergoing testing on OV-105 only. The standard toilet must be removed from the vehicle after each flight and returned to JSC for cleaning and processing. The EDO toilet can remain in the vehicle and thus saves processing time.
[From oliver@vf.jsc.nasa.gov. This item came about in the discussion pertaining to the legitimacy of #5]

(39) Some western speculators, back when the Soviets were still in the race to beat the US to the moon, were wondering what the Soviets would use as a lunar lander, as they could not (until recently) find evidence of a separate lunar lander vehicle. They came up with the concept that an enhanced Soyuz, complete with landing legs, would be used to land vertically on the surface of the moon, and even used the re-positioning of the main hatch to verify this! This would mean that a cosmonaut would have had to descend a ladder some 2 stories high to get to the Lunar Surface!
[The Soviet Manned Space Programme - Salamander Books]

(40) In the early 80's, the soviets were flying small 'cosmos' experimental vehicles which confounded international observers. Cosmos 1374, launched in June of 1982, was recovered in the Indian Ocean. The soviets issued a standard Cosmos-type announcement, failing to include an orbital period, yet stating that the mission was a success. The next similar flight, cosmos 1445, came nine months later. The retrieval of this one, simlarly with 1374, was observed by the Royal Australian Air Force, but in this case photographs were released to the rest of the world, revealing that the soviets had been testing a a small winged orbiter, with demensions of 3.4m length, 1.4m fuselage diameter and a wingspan of 2.6m.
There are two more interesting notes. Firstly, Cosmos 1374, unlike 1445, did not have any identifying national markings, indicating that the RAAF was an undexpected visitor to the retrieval area. Secondly, the reovery ship (the Yamal) and apparently many members of the the Soviet recovery team, were the same for both spacecraft retrievals. There is one man with an identical head of Afro-styled hair who appears in both photographic series of the retrieval sequences, despite the two missions happening 285 days apart!
[The Soviet Manned Space Programme - Salamander Books. Peter Pesavento, Correspondence to the BIS Spaceflight magazine, Sept 1991.]

(41) The soviets had a large Saturn V type booster in development for the soviet manned assault on the Moon. This launcher was designated by many names, namely by G-1 or G-1e in the west in early years, but now as the SL-15 or N-1 booster). By mid 1966, US reconnaissance satellites spotted test facilities under construction at Tyuratam. By 1968 static test models had been built and between March and April a full sized version was moved from its fabrication area to the launch pad and back.
[The Rocket - David Baker - New Cavendish Books.]

(42) The attempts to launch the G-1/N-1/SL-15 soviet booster are:-
(a) February 21, 1969: The booster exploded 70 seconds after lift-off, when a fire developed in the tail section of the rocket. The booster was labelled 3L, and had an L-1 Zond Spacecraft.
(b) July 3, 1969: A liquid oxygen pump failed causing an explosion that wrecked the launch site. Designated 5L, this booster is assumed to have had the same payload and launch aim as the first, namely to enter an orbit to the moon and attempt a lunar flyby.
(c) July 21, (Or June 27?) 1971: The rocket fell back on the launch pad causing more extensive damage.This launcher, designated 6L, had a mock-up of the lunar module, lunar lander and escape system.
(d) November 23, 1972: A fire developed in the engine compartment close to the end of the 1st stage burn and the booster exploded after 107 seconds of flight. Designated 7L, it had a proper lunar orbit module and escape system and a mock-up lunar landing module. It was planned this would be an Apollo 8 style, but unmanned, lunar flyby.
[BIS Spaceflight, June 1991 and June 1992]

(43) The one remaining G-1/N-1/SL-15 heavy lift booster (the fifth in the series that were built), which did not get a chance to fly due to the cancellation of the program, was partially converted into a bandstand for a town close to the launch site.
[BIS Spaceflight, June 1991]
(43a) The 8L booster was nearing a 1974 launch date. Another booster was also being readied, parts for more were on hand. All assembly was done at Baykonur. There was growing confidence these boosters would perform better since significant modifications were made from the 4th launch onward.
[dennisn@comm.mot.com (Dennis Newkirk)]

(44) There were several things to mention about Helens Sharman's flight to the MIR space station on May 18, 1991.:-
(a) Great Britain was the 22nd nation to fly a citizen into space
(b) Helen Sharman was the joint 248th person in space
(c) She was the 15th woman into space
(d) For the first time a nation's first space traveller was a woman.
(e) She was the first non-soviet, non-american woman into space.
(f) One record that was just missed: because the American Space Shuttle Columbia was delayed from its scheduled launch

date of May 22, the chance to set a new record or 4 women
in space simultaneously was lost. (This was sts-40, which
finally took off on June 5th.)
[BIS Spaceflight, July 1991 - Please see item 233]

(45) Gagarin's flight began under a cover of secrecy. Nobody except the
heads of Korolev's design bureau and the KGB knew of the place of
landing. The inhabitants of Saratov could not even have suspected
how close they were to the historic landing site.
But the secrecy wasn't complete. Skilled workers were required
to deal with measuring and other devices to dismantle them. These
workers were taken by KGB agents from one of the nearby plants. They
were told by the director of the plant that they were close to the
landing site of Vostok.
One of the workers had a camera and was able to take a clear
photograph of Vostok that wasn't released until 1991!
[BIS Spaceflight, August 1991. And they show the photo!]

(46) The Lunar Landing Research Vehicle, developed to train US astronauts
on how to control the Lunar Lander for flights to the moon, was
a strange contraption built with a turbofan engine facing down
vertically in the centre to provide vertical thrust with a weight
distribution and throttle reaction time similar to that of the
real Lunar Lander. It was based around the early VTOL 'Flying
Bedsteads' developed to study the potential of Vertical Take-Off
and Landing for jet aircraft.
[Ed Henegveld, BIS Spaceflight, December 1992]

(47) Neil Armstrong had a close brush with death in a 'flying bedstead'
LLRV on May 6th, 1968, when the craft went out of control and he
was forced to eject. He landed by parachute and walked away without
injury!
[Ed Henegveld, BIS Spaceflight, December 1992]

(48) Yuri Gagarin, on the maiden launch of a man into space, landed in a
field some 26km south-west of the town of Engels in the Saratov
Region. In his orange flight-suit he approached a woman and a little
girl with a calf. The cosmonaut was asked if he came from space.
And of course he replied "As a matter of fact, I have!"
[Neville Kidger - BIS Spaceflight, April 1991]

(49) Compared with the desired profile, the edge of the mirror surface
of the primary mirror on the Hubble Space Telescope is too low by
0.002mm. This results in an error where the Light from the edges
of the mirror come to a focus about 38mm beyond where the innermost
rays converge.
[BIS Spaceflight, April 1991]

(50)The US Army Redstone missile has had a long and ditinguished service
record.
(a) A modified redstone, redesignated Jupiter C or Juno 1, sent into
space the United States first satellite - Explorer 1 - on

January 31, 1958.
(b) It was used for the first manned American spaceflights of Shepard and Grissom in 1961.
(c)It was the first rocket to detonate an atomic weapon (Project Hardtrack in 1958) above the Earth's surface.
(d) It was the launcher used in Project SPARTA, a joint US/UK/Australia programme of re-entry research. The last of the 10 Redstones shipped to Australia for the project was used to launch WRESAT, Australia's first satellite.
[Keith Scala, Michael Crowe, BIS Spaceflight, August 1991.]

(51) The first real watch to be worn in space (Yuri Gagarin had a timepiece which was not a true Chronograph) was in July 1962, when Scott Carpenter flew the Aurora 7 Mercury capsule.
[Alan A Nelson - BIS Spaceflight, April 1992]

(52) The Omega Speedmaster Professional, later to become standard issue to all Gemini, Apollo and Skylab Astronauts, was first flown by Wally Schirra aboard Sigma 7 in October 1962. This watch was later known as the "Moon Watch" as it was the first watch worn on the Moon.
[Alan A Nelson - BIS Spaceflight, April 1992]

(53) The television series 'The Six Million Dollar Man' showed a terrible aircraft accident at the beginning of each episode, supposedly indicating how 'Steve Austin' was injured. The actual sequence was of a real accident on May 10, 1967, when NASA test pilot Bruce Peterson was fortunate to escape with his life in an experimental aircraft known as the M2-F2 lifting body. This small craft was part of a development to test the aerodynamics of small wingless craft that could generate aerodynamic lift through the simple shape of its body. They came thundering down at incredible speeds, and attribute much of the information that is required today for the one-attempt-only langings made by the Space Shuttle.
[Space Flight News, May 1986. (No longer Published.)]

(54) The Apollo 10 crew of Tom Stafford, John Young and Gene Cernan put themselves in the record books by achieving the highest speed ever attained by man - 24,790mph.
[Space Flight News, July 1986. (No longer Published.)]

(55) The Lunar Rover, as used on Apollo missions 15, 16 and 17, had a lifetime of 78 hours, and could cover up to 92kms. It could carry up to 400kg (Earth weight) - more than TWICE its own weight. (An average family car can usually only carry half its own weight). Fully loaded it could climb a 25 degree slope, and on the flat it could reach a top speed of 16km/hr. It would be an almost precise 1/6th slow-motion replay of a car going 86km/h on Earth!
[Space Travellers Handbook, Michael Freeman, Sovereign Books.]

(56) A 'logical lock' was in use on the Vostok spacecraft to lock out any actions that Yuri Gagarin might make in a panic. At that time, nobody knew how a human would react to space, so the logical lock idea was

created. Yuri Gagarin had a small envelope in which the logical lock code was written, and in order to use the controls he would have to prove that he was capable of doing the simple task of reading the combination and punching 3 of nine buttons.
[Space Flight News, November 1986. (No longer Published.)]

(57) There is a slide wire 'flying fox' type system at both launch pads 39a and 39b that the astronauts can use in the event of en emergency at the launch pad.
[Space Flight News, February 1987]

(58) At the base of the slide wire system used for emergency astronaut escapes at pads 39a and 39b, is a modified military M113 tank used to evacuate the atronauts and support personnel from the vicinty of the launch pad in a protective environment. In actual fact there are 3 tanks. One near the base of the slide wire, one at the blast demarkation line some 4,485ft from the launch pad, and another three miles away in the hands another fire/rescure team.
[Space Flight News, February 1987]

(59) The military has a long history of starting and then dropping astronaut and other manned programs - such as the Manned Orbiting Laboratory, the Dyna-Soar, etc.
The latest one was the Manned Spaceflight Engineer program - and it did succeed in getting two Air Force payload specialists onto the Space Shuttle. Gary Payton (STS-51C) and Bill Pailes (STS-51J) flew before the Challenger accident.
After Challenger the whole program was reconsidered and the military decided to concentrate on unmanned launch vehicles. The MSE program was disbanded and the people reassigned.
The person who had probably the best chance of flying next was Kathy Roberts - but the Air Force dropped the program before she flew.
[from CHARLES D. PHILLIPS]

(60) The Johnson Space Center in Houston has two control rooms where technicians can monitor the Shuttle's onboard systems. The original control and display consoles in these rooms (dating back to the mid 1960's and the Gemini program) are still in use today. In the near future these consoles will be replaced with modern computer workstations.
[Tour Guide, Johnson Space Center, Houston TX
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(61) Both of the control rooms at JSC have a viewing gallery behind a wall of one-way glass. These viewing galleries are open to the public on days when the Space Shuttle is NOT in orbit (for security reasons). In fact, the galleries are closed to the public 24 hrs before launch time. However, VIPs (the President, Senators, Congressmen, and visiting dignitaries) occasionally are present to watch the progress of a Shuttle mission from these galleries.
[Tour Guide, JSC from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(62) The first time four spacecraft had ever been docked together came on 22nd April, 1987, when the Russians had together Soyuz-TM2, Mir, Kvant and Progress 29.
[Space Flight News - May 1987]
(62a) There is a vastly superior record which was set on January 26, 1993. Soyuz TM-16 docked with the MIR space station, whilst both Soyuz TM-15 and Progress M-15 were still there. The existing spacecraft consisted of the MIR central core, Kvant, Kvant 2 and Kristal.
[BIS Spaceflight, May 1993]

(63) On the first four flights of Columbia, there were only two crew members, the Commander and the Pilot. Each was launched seated in a modified version of the rocket ejection seat installed in the SR-71 'Blackbird'. This seat could safely eject them away from the Orbiter in case the control system should malfunction and send it out of control.
[Bob Overmyer, Space Flight News, May 1987]

(64) Originally it was thought that the shuttle ejector system could be used to eject from the launch configuration as long as the Shuttle system was below 100,000 feet, but it was discovered later that once the solid rocket motors were burning, a crewmember ejecting would descend into the rocket plume.
[Bob Overmyer, Space Flight News, May 1987]

(65) Crew safety concerns for the shuttle heightened when the results of the ditching tests conducted at the U.S. Navy David Taylor Model Basin become known. At the Taylor test facility, large-scale models of the Orbiter were catapulted over a long water trough. They contacted the water in attitudes and speeds simulating Orbiter ditching conditions. No-one had ever ditched an airplane at the typical landing speeds of the Shuttle and the results were disappointing. When the model contacted the water in the flat attitude that was achieved with a normal landing speed of 200 knots, it would skip badly and become airborne again. The second or third contact was usually very violent, resulting in forces that would totally destroy an Orbiter.
When the model simulated the slower landing speeds made possible by the delta-wing configuration, the nose-up attitude would cause the body-flap to contact the water first, and the cockpit would pitch down violently, slamming into the water.
One interesting test showed that if the orbiter approached with the landing gear down, it would immediately turn into a 'submarine' and dive straight to the bottom!
[Bob Overmyer, Space Flight News, May 1987]

(66) On STS-5, there were 5 astronauts on board, but the two ejection seats remained in place unarmed. It had been originally proposed that the escape sequence would continue as follows:-
The astronaut seated in the centre seat on the flight-deck would leave his seat and descend to the mid-deck if an emergency arose. The

three in the mid-deck would then don parachutes, wait for the Commander and Pilot to eject, and then climb through the two holes in the roof. This was rejected quickly, as it was found that the control wires would be severed in the roof after the ejection, and the orbiter would definitely go out of control. Besides this, those that crawled out would be brought around and slammed into the OMS pods on the rear of the orbiter!
[Bob Overmyer, Space Flight News, May 1987]

(67) Using a small setup of around 25-pounds worth of Radio equipment, a teacher and a group of students at Kettering Grammar School, England, were regularly keeping track of the Soviet 'eight day wonders' - recoverable satellites in the cosmos series. In 1966, differences in some of the orbits led to the discovery of a new Soviet launch site that had previously been a closely guarded secret of the USSR and the Pentagon. This site was christened in the west as 'Plesetsk'. Nearly 20 years passed before the Soviet Union publicly announced the existance of the site, and the Kettering group were proud to hear that they maintained the same name.
[Space Flight News, May 1987]

(68) The kettering group, a small team of students and their teacher at Kettering Grammar School, England, were keeping track of the Soviet Soyuz-11 manned spaceflight. They received the signals of the depressurization of the Soyuz module, and were keeping track of the cosmonaut's heartbeats up until they lost contact. The capsule would have landed within 30 minutes of this loss of signal, but unfortunately all three cosmonauts were found dead. If they had been wearing their space-suits at the time, they might have survived.
[Space Flight News, May 1987]

(69) In the weightlessness of space, the antennae of the big Hughes Intelsat 6 spacecraft would be able to unfurl on their own, but during Earthly tests the two larger antennae needed some help to defy gravity. Engineers at Hughes Aircraft Company in El Segundo, California, turned to Helium-filled ballons to perform the task!
[Space Flight News, June 1987]

(70) The current soviet spacesuit, used on-board the MIR space station, requires the cosmonaut to swing the back-pak around and step into it from the back!
[Space Flight News, July 1987]

(71) Believe it or not, the final analysis showed that, although 'Columbia' basically had about 30,000 separate tiles on its exterior, they installed - in the period from May '79 until it finally flew in April '81 - a grand total of over 90,000 tiles!
[Bob Overmyer, Space Flight News, July 1987]

(72) On STS-5, even though the commander and pilot ejector seats were disarmed, those two astronauts had to wear the SR-71 harness-type

waistcoat in order to remain compatible with the seat!
[Bob Overmyer, Space Flight News, July 1987]

(73) STS-5 was also the first time astronauts wore the now familiar
pale-blue suits used before the Challenger accident. (This was
used in place of the SR-71 type flight-suits used on the first
4 flights.)
[Bob Overmyer, Space Flight News, June 1987]

(74) The shears used by astronaut Joe Kerwin to sever the strap of debris
retaining the jammed solar wing on the Skylab Space station, were of a
type more usually employed for snipping barbed wire. Manufactured in
Missouri, they were purchased by NASA for the princely sum of $75!
[Space Flight News, August 1987]

(75) Whilst the Shuttle was still in development, Fred Haise amd Jack Lousma
were scheduled to pilot STS-3 which was to have boosted Skylab back
into orbit. Alas, Skylab to down in Western Australia in 1979, 2 years
before the 1st flight of Columbia.
[Bob Overmyer, Space Flight News, October 1987]

(76) The Soviets have a long-standing custom of only calling their people
'Cosmonauts' after they have travelled in space. This conflicts with
the US version, where astronauts are so named as soon as they have
been accepted into NASA employment after passing the selection tests.
[Space Flight News, August 1987]

(77) Pete Conrad became the first tattooed man in space on the Gemini 5
mission. He had a blue anchor and stars tattooed on his right arm.
[Space Flight News, October 1987]

(78) To train Shuttle pilots prior to making their flight, in the area of
landing, NASA uses a modified Gulfstream 2 executive jet. The cockpit
has been divided into two - with Shuttle controls on the left, and
all the Gulfstream controls on the right.
[Space Flight news, December 1987]

(79) The flight dynamics of the Shuttle were calculated before the Shuttle
actually flew, and the Gulfstream 2 trainer was modified accordingly.
The calculations were quite accurate, and very few changes have been
made since the Shuttle has entered service.
[Space Flight news, December 1987]

(80) The following is a long list of trivia tid-bits which comes from the
December 1987 issue of Space Flight News. It was published as a quiz,
and the answers were found in the same issue. Only those questions
worthy of being items of trivia are included.
(a) This is a list of 'should not have but did' of what some astronauts/
cosmonauts took into space.
(i) The crew of Vostok 2 used a box of matches they carried in
their flight to light a fire after they had overshot the landing
zone.
(ii) Tom Stafford took a small set of handbells along for the

Gemini 6 mission, which took place just before Christmas.
(iii) The crew of Apollo 15 broke NASA regulations, and were later severely reprimanded, for carrying a batch of first-day covers to the surface of the moon in their personal lockers.
(iv) Gus Grissom ate a corned beef sandwich on the Gemini 3 mission. It was given to him by his crewmate, John Young, who had sneaked it on board. (The sandwich was given to John Young by Wally Schirra.) Grissom later vomited, ruining a dietary experiment NASA had set for him.
[Wally Schirra addition, from Allan Bourdius <ab3o+@andrew.cmu.edu>]
(b) Bits 'n Pieces.
(i) A helmet visor was cracked on the Gemini 3 mission, when Gus Grissom's helmet struck the instrument panel as he was thrown forward during the automatic parachute descent sequence prior to splash-down in the Atlantic Ocean.
(ii) A camera was left in Earth Orbit during the Gemini 10 mission.
(iii) A feather was dropped on the Apollo 15 mission. This was done alongside a hammer to prove that one of Galileo's most significant laws was indeed correct. The feather and hammer hit the surface of the Moon at the same time.
(iv) Apollo 16 astronaut John Young tripped over one of the leads attached to ALSEP, rendering it useless and falling to the surface.
(v) Valentina Tereshkova bruised her nose on the landing of Vostok 6 in June 1963.
(c) Planetary Bits
(i) Luna 3, the Soviet Probe, returned the first pictures of the Moon's previously unseen farside in October 1959.
(ii) Luna 10 became the first spacecraft to enter orbit around the Moon in April 1966.
(iii) Venera 4 became the first successful soviet mission to Venus by delivering a small capsule in October 1967.
However, it was crushed before it reached the surface. Venera-7 in 1970 was the first mission to successfully land.
[Venera 7 item added by jcm@urania.harvard.edu (Jonathan McDowell)]
(iv) Venera 9 returned the first pictures of Venus' surface in October 1975.
(v)Mariner 10, from the US, is the only spacecraft ti have reached Mercury. It made 3 flybys of the planet.
(vi) Pioneer 10 was the first operating spacecraft to cross the asteroid belt en route to Jupiter.

(81) On the first separation test of Enterprise and the Boeing 747 in the Approach and Landing Test program of 1977, the Shuttle separated from the 747 that the first photograph - initially intended to be taken when the orbiter was a few feet away from the orbiter - was taken when the orbiter was over 70 feet away from its carrier.
[Bob Overmyer, Space Flight News, March 1988]

(82) The original circular hatch to be used for entering and exiting the Lunar Module on the surface of the Moon was squared-off when

astronaut Roger Chaffee observed that it was difficult to clamber through a round hatch with a square backpack on - particularly going backwards.
[David Shayler, Space Flight News, April 1988]

(83) Descent and Ascent stages of the Lunar Module were passed through a bizarre procedure to ensure that loose parts or tools weren't left lying around inside it. This involved mounting the device on a large support structure and rotating it slowly to free loose items and let them drop to the floor.
[David Shayler, Space Flight News, April 1988]

(84) Once locked into their landing position, the legs on the descent stage of the Lunar Module could not be retracted again.
The same is also true of the landing gear on the space shuttle.
[David Shayler, Space Flight News, April 1988]
[Shuttle addition from Allan Bourdius <ab3o+@andrew.cmu.edu>]

(85) The landing probes on the feet of the Lunar Module were fitted to all but the forward gear. The probe was removed from this leg after astronauts McDivitt and Schweickart tested the Lunar Module LM/3 Spider in Earth orbit for the first time in March 1969. It was thought that the probe might curl up and prove to be a hazard to the astronauts as they stepped on and off the final rung of the ladder that led them to the surface from the exit hatch of the Module.
[David Shayler, Space Flight News, April 1988]

(86) The ladder mentioned above was made of a material that was so light-weight that it could only support the weight of a man in the 1/6th gravity of the Moon. On Earth the ladder would break.
[David Shayler, Space Flight News, April 1988]

(87) Because the Lunar Module did not have an air-lock, the Module had to be depressurized and repressurized before and after every excursion. For this reason and as a general safety precaution, the hatch was left slightly ajar as the astronauts were roaming around the surface. Imagine being locked out of your vehicle so far away from home!
[David Shayler, Space Flight News, April 1988]

(88) On Feb. 21, 1969 in the final hours of the countdown of the first launch of the massive N1 booster, Cheif Designer Mishin went to the launch pad while propellants were still being loaded, and cristened the rocket traditionally be breaking a bottle of champaign against the cold hull of the rocket.
[IZOBRETATEL I RATSIONALIZATOR, No. 8, Aug, 1990, pp 20-21, "The History of Technology: How We Conceeded the Moon: A Look by One of the Participants of the N-1 Drama at the Reasons Behind it", by Vad. Pikul. FBIS-USP-91-002. Submitted by dennisn@ecs.comm.mot.com]

(89) Lazarev and Makarov, the crew of Soyuz 18-1, who were forced to abort the launch after half the explosive bolts holding the first and second stages of the booster together failed to blow. After a 14g reentry

from 90 miles up their capsule hit a mountain near the Chinese border
and rolled down, leaving another crew to spend a day huddled round a
fire waiting for rescue.
[Source: Janes Manned Spaceflight Log,
from Mark Grant <mark@isltd.insignia.com>]

(90) Although during the day it is only possible to watch a shuttle launch
with the naked eye until just past SRB seperation, a night launch
with clear skies can be followed until the main engines cut out.
[Source: STS-35, which we could see until it disappeared behind a
cloud when 1200 miles downrange. Mark Grant <mark@isltd.insignia.com>]

(91) The early days of space flight at Missile Firing Laboratory were a
mixture of experienced engineers and scientists with seemingly crude
and brute force methods to launch missiles.
"With the launch of Redstone #1 in August 1953, the Missile
Firing Laboratory inaugurated the testing of balistic missiles. In
those days, launch procedures were unsophisticated. Albert Zeiler,
one of the Peenemunde veterans, had to decide within a split second
whether to shut off the engine immediately after ignition, basing his
decision upon the color of the flames. An off-color indicated an
improper mix of the propellants. A couple of minor delays had
occurred earlier, but on the morning of 20 August 1953 the flame
color met Zeiler's approval, and the Redstone rose."
["Moonport, A History of Apollo Launch Facilities and Operations",
Charles D. Benson, NASA History Series, NASA SP-4204, pages 7-8, 1978.
Submitted by gregb@tunfaire.den.mmc.com]

(92) The Russian Foton class Cosmos vehicle, used today for remote-sensing
and Earth photography applications, is the same Vostok capsule
that launched Yuri Gagarin into space back in 1961!
[Space Flight News, June 1988]

(93) Pad 39B, one of the two Shuttle Launch complexes, has been used very
few times. In fact, the only times it has been used previous to
Shuttle flights are:-
(1) Apollo 10 in May 1969,
(2) Skylab 2 in May 1973
(3) Skylab 3 in July 1973,
(4) Skylab 4 in November 1973
(5) The Apollo/Soyuz flight in July 1975.
[Space Flight News, August 1988]
LC39B has been used for 19 of the 31 missions since Challenger up
to STS-57, so these days it is the busiest pad. There have now been
25 launches from LC39B and 48 launches from LC39A.
[Updated 31/7/93. From jcm@urania.harvard.edu (Jonathan McDowell)]

(94) Pad 39B was first used on a Shuttle Launch in 1986 by the ill-fated
51-L Challenger flight. This contributed nothing, by the way, to
the accident itself.
[Space Flight News, August 1988]

(95) Astronaut Charlie Bolden, veteran of the 61-C/Atlantis missions in January 1986, became the first man to ride the slide-wire escape system on Pad 39B on July 8, 1988, reaching a maximum speed of roughly 55mph.
[Space Flight News, September 1988]
(Some people have already expressed doubts of this. Can anyone come up with evidence of earlier use?)

(96) Chinese SKW recoverable satellites have an interesting feature in their structure. To withstand the heat of re-entry, the Shuttle uses special tiles, and Soyuz uses a special ablative material that melts away as it gets hot. The Chinese, on the other hand, use Wood.
[Space Flight News, October 1988]
(We've heard that this wood is OAK. Does anyone have any information on this?)

(97) The only two countries which refused to telecast Neil Armstrong's moonwalk were the USSR and China.
[Space Flight News, March 1989]

(98) LENGTH WARNING - This one's quite large.....
"One evening, during the launch pad checkout of the stacked Apollo spacecraft and Saturn 5 launch vehicle for Apollo 17, one of the support crew astronauts had to enter the Lunar Module to conduct some checking and testing. The Lunar Module was nestled under the protective shield of the Apollo Command & Service Module and the streamlined launch vehicle nose-fairings.
Normally, all workers on the Saturn stack had to empty their pockets at the control points before getting close to the vehicle. Astronauts had permission to wear their standard flying suits in the Lunar Module and Command Module, as long as they kept their pockets zippered closed.
On this particular day, however, the astronaut in question had some coins in his breast pocket, which had been left unzipped by mistake. As he traversed the catwalk to the Lunar Module, he leaned over and coins spilled out. They could be heard bouncing off the structure as they fell through the Instrument Unit ring and lodged somewhere against the top of the S4B third stage that would propel them from low-Earth orbit to the Moon.
I calculate that the coins stayed there until after the Trans Lunar Injection 'burn', when the S4B put them on the same trajectory to the Moon as the CSM/Lunar Module combination."
Some day in the distant future, people are going to walk on the Moon again, and they may just find a few US coins lying in the dust!
[Bob Overmyer, Space Flight News, June 1989]

(99) With a total Height of over 75 feet, the 747/Orbiter combination has been described by some journalists as 'The World's Largest Biplane!'. Suprisingly, the Russian Antonov/Buran combination is even larger still.
[Space Flight News, June 1989]

(100) The Shuttle Carrier Aircraft must never be flown with the Shuttle aboard if the ambient temperature is less then 15 degrees Farenheit. This is because, on the type of long-duration flights the SCA typically makes when ferrying the orbiter, there is a risk of fluids within the Orbiter freezing and causing some serious problems.
[Space Flight News, June 1989]

(101) The shuttle has two possible positions or 'attitudes' available when onboard the SCA 747. The initial attitude was a 'nose up' attitude, and this was used primarily for the Approach and Landing Tests of the late 1970's. Presently, the Shuttle spends most of its time in the second available position, where it is more or less parallel to the SCA's upper fuselage.
[Space Flight News, June 1989]

(102) The Shuttle's tyres are designed to withstand temperature extremes of minus 65-degrees Farenheit to plus 200-degrees Farenheit, and are inflated, with the craft standing static on the runway, to a pressure of 327psi, with an over-inflation margin of 40psi.

(103) Apollo 1 was scheduled to actually fly in late 1966. As development of the block-1 spacecraft progressed, it became apparent that the Command Module earmarked for the Apollo 1 missions would not be ready in time for a tentatively-scheduled joint flight involving the tenth and final manned Gemini mission, Gemini 12, in late 1966. The tragic Apollo 1 fire occurred on January 27, 1967.
[Space Flight News, November 1989]

(104) It is unfortunate that NASA did not learn earlier about the fire hazard problems associated with a pure-oxygen atmosphere in the Block 1 Apollo Comand Module design. Flash fires had previously broken out in two boilerplate cabin mock-ups in September and November of 1963.
[Space Flight News, November 1989]
(104a) Also, Soviet cosmonaut Valentin Bondarenko was killed in a pure oxygen flash fire in a training simulator in March 1961. This was only revealed in the late 1980s.
[This was revealed in a series of articles in Isvestiya in April 1991 marking the 30th anniversary of Gagarin's flight. The story is available in Mike Cassutt's new book Who's Who In Space. (Macmillan: 1993, $55) which I would recommend if I could find the ISBN number.)
From jcm@urania.harvard.edu (Jonathan McDowell)]

(105) Post-accident investigations revealed that Ed-White spent his dying moments trying to open the hatch of the Apollo 1 spacecraft. The hatch was criticised as one of the major factors contributing to the death of the three astronauts in 1967. It is not widely appreciated that a revised hatch design was already under development at the time of the Apollo 1 tragedy.
[Space Flight News, December 1989]

(106) When Gus Grissom and John Young came to name their Gemini 3 spacecraft, they chose the title 'Molly Brown' after a character in a play that was running on Broadway at that time: The Unsinkable Molly Brown. NASA officialdom baulked at such an apparently flippant title and refused the astronauts permission to adopt it. Nevertheless Grissom and Young devised an appropriate patch to wear on their spacesuits: it depicted their Gemini capsule floating in the Ocean, with the name Molly Brown emblazoned above it.
All of this should have been maintained in 'low profile' mode, with the official callsign being "Gemini 3". However, the CAPCOM (Capsule Communicator) at launch, astronaut Gordon Cooper, blew Grissom and Young's cover by exclaiming, as the rocket cleared the tower 'You're on your way, Molly Brown!'.
[Chris Faulkner, Space Flight News, January 1990]

(107) On average, the Apollo astronauts spent a total of about 22,000 hours in simulator sessions, 5,000 hours in briefings, and 3,000 hours conducting hardware tests.
If one includes in this figure time engaged in related training, the eleven Apollo-series missions absorbed a staggering 84,000 hours of astronaut training and briefing time.
[Space Flight News, January 1990]

(108) On Apollo 11, the crew were worried that Neil Armstrong's leg might snag the abort handle, ending the mission in the Atlantic ocean just minutes after it had started!
[Space Flight News, January 1990]

(109) Dick Gordon, on Apollo 12, was so convinced that lightning storms would delay the launch 24 hours, that he managed to drift off to sleep during the countdown.
[Space Flight News, January 1990]

(110) At the end of Apollo 12, the hardest ocean landing was recorded - 15G! This jarred a 16mm camera from its mounting, hitting Al Bean's head.
[Space Flight News, January 1990]

(111) Many of the tests that the Mercury astronaut candidates took are now considered to have been unnecessary. Things like 'Write twenty sentences beginning with the words 'I am...', or stare at a blank piece of paper and describe what you see. Scott Carpenter, it is reputed, when stuck for his twentieth sentence, wrote in anticipation 'I am prospective Mercury Astronaut.' stating afterwards that this simple statement tipped the balance towards his selection.
[Space Flight News, January 1990]

(112) The Mercury capsule had in effect some seven miles of wire used for its control system, but had a total internal volume roughly equal to that of a telephone booth.
[Space Flight News, January 1990]

(113) The Pad Rescue Team came closest to performing an emergency rescue during a launch attempt for the maiden voyage of Discovery - mission

41-D - on June 26, 1984. At T-4 seconds, the SSME main engines were abruptly shut down. With hydrogen running free in the vicinty of the now hot engines, everyone held their breath. Then a fire was detected along the trailing edges of the orbiter's elevons, and the orbiter itself began to burn.
The crew sat tight as the water-deluge systems were activated.
A few tense moments rolled by with the Rescue Team sitting suited and waiting for a 'Go' from mission control. The fire went out, the vehicle made safe and the crew extracted after just 35 minutes.
[Space Flight News, June 1990]

(114) Of the Apollo astronauts, nearly all of them are alive. Sadly, Jack Swigert was the first Circumlunar (Apollo 13, non orbital), Ron Evans the first Lunar Orbiting, and Jim Irwin the first the first Moon Walking, Apollo astronauts to die.
[Original item was vastly incorrect. Thanks to many people for pointing this one out, and thanks particularly to jcm@urania.harvard.edu (Jonathan McDowell) for giving the correct information.]

(115) A special machine was assigned to cut some 8,500 miles of grooves into the Shuttle runway at Kennedy Space Centre. These grooves provide a means to remove the water from the runway, and provide for extra grip in the wet. (But when does the shuttle ever land whilst it's raining?). The section of the runway where the orbiter touches down was smoothed in 1988 to reduce tyre wear and wear to the brake mechanism at the point of contact.
[Space Flight News, February 1988]

(116) The Soviet R-7 (A-series, SL-1/2/3/4/6/7 or SS-6) booster was first used in 1957 to launch Sputnik 1 and it is still in active service. The first stage consists of a central core and four strap-ons. It was/is used to launch:
(a) Sputnik 1-3 (A version, no second stage)
(b) early Lunas, Vostok etc. (A-1 second stage added)
(c) Voshod, Soyus, Progress etc. (A-2 second stage)
(d) early Veneras, Mars 1, Molniya, Luna 4-14 etc
(A-2e second stage)
[Hart: The Encyclopedia of Soviet Spacecraft, 1987
Submitted by Paul.Keinanen@Telebox.tele.fi]

(117) Other than the launch escape tower, the entire Mercury-Atlas vehicle that put John Glenn into orbit will fit inside the payload bay of the shuttle (or at least it works with 1/144 scale plastic kits 8-)). I don't have any mass information handy on the Atlas, so I'm not sure whether a fully fuelled Mercury-Atlas would be under the shuttles payload mass limits though.
[Mark Grant <mark@isltd.insignia.com>]
The lift-off mass for Mercury-Atlas was 118 tons and the nominal payload capacity for low inclination shuttle launces was initially 29.5 tons. However, the Mercury-Redstone lift-off mass was about

30 tons including the escape system.
[Gatland:The Pocket Encyclopedia of Spaceflight in Color, 1967
from Paul.Keinanen@Telebox.tele.fi]

(118)A small research rocket "Aerobee" was being tested at sea in Jan 1950. In the North Pacific and Gulf of Alaska. The Areobee was a small liquid fuel rocket with a solid fuel booster stage. One of these at sea (on a ship) tests "misbehaved in a suprising manor. Apparently as a result of a leaking valve, the rocket suddenly took off 10 minutes ahead of schedule and climbed slowly and quietly by itself, leaving the booster, unignited, in the launching tower. ... The defective valve apparently never did fully open; calculations made as a result of this event indicated that an Aerobee fired without booster should go about twice as high as one that did. Of course no Aerobee has ever been fired without a booster on purpose."
[Page 286, _Rockets, Missles, and Space Travel_ by Willy Ley, (c)1957 Viking Press. Library of Congress # 57-11123.
Submitted by wa2ise@netcom.com (Robert Casey)]

(119) Virgil 'Gus' Grissom was sadly one of the first of the original 7 Mercury astronauts to die. He perished tragically in the Apollo 1 fire of 1967.
[From Allan Bourdius <ab3o+@andrew.cmu.edu>]

(120) In 1958 the Great Red Aurora, which could be seen as far South as Mexico, blacked out the whole of North-eastern Canada by overloading the power lines.
[Beyond 2000, Book One, Intercontinental Publishing Corp. Ltd]

(121) The Aurora Borealis, the 'Northern Dawn', is so powerful that each year it discharges enough energy to run the whole of the United States for 8 to 9 years.
[Beyond 2000, Book One, Intercontinental Publishing Corp. Ltd]

(122) The 100th EVA in history (both US and Soviet, Earth Orbit and Lunar) occurred on September 15, 1992, when Anatoli Solovyov and Sergei Avdeyev completed their fourth EVA to install a 700kg VDU on the Sofora Girder located on the external skin of the Kvant module.
[BIS Spaceflight, November 1992]

(123) In the process of installing the VDU on the Sofora girder, the two cosmonauts removed what was probably the last Soviet flag still flying, located at the top of the girder. They reported that the flag, which had been in place since 1991, looked 'tattered'.
[BIS Spaceflight, November 1992]

(124) The androgenous docking system, called APAS, located on the Kristall technology module, was designed to be used by reusable spacecraft such as Buran and the US Space Shuttle. This port was first used by Soyuz TM-16 in January 1993.
[BIS Spaceflight, May 1993]

(125) Mike Collins has written some terrific books about the spaceflight
experience. He lost the camera in Gemini 10 (and felt terrible
about it! My favourite quote of his (from Carrying the Fire):
(someone asked him what goes through his mind at 'blastoff') his
reply: "Well,you think about the fact that you are at the top of
6 million parts, all made by the lowest bidder!"
[From quagga@trystero.com aka Cheryl]

(126) The tip of the escape tower on the Saturn V/Apollo was topped by an item
called a Q-Ball made by a company called Nortronics. That's all I know
for certain. I surmise it may have been an optical retroreflector to
get an accurate position measurement at initial lift-off, but it could
have been something more exotic. Any answers would be appreciated.
[From rriemer@nas.edu]
I believe it is like an aircraft pitot tube and measures the
value of 'Q', the dynamic air pressure. (Ever heard of MAX-Q? It is
the period of ascent during which the shuttle must throttle back due
to the thickness of the air and the speed of the orbiter.)
[From jcm@urania.harvard.edu (Jonathan McDowell)]
Discussing the escape tower.... "The extreme nose of the
cylindrical structure housed the two canards and a Q-ball, a device
equipped to sense different dynamic pressures on the nose of the
ascending vehicle and to monitor the space vehicle's angle of attack
during flight."
[Baker, David. The History of Manned Space Flight. New York: Crown
Publishers, 1981. ISBN 0-517-54377-X. Page 258.] Also,
"Saturn/Apollo" is better terminology that "Saturn V/Apollo"--the
same escape tower and Q-ball was used on the Saturn IB launches of
Apollo 7, the three Skylab missions, and Apollo/Soyuz.
[From kelvin@autodesk.com (John Walker)]

(127) John Young is the only astronaut to have flown 6 missions.
[One of our local NSS chapter members pointed this out, and I was
wondering if it was true. Can anyone help here?]
Update July 1993:
Young is still the record-holder with 6.
Vladimir Dzhanibekov has flown 5 now. (Soyuz 27, 39, T-6, T-12, T-13).
Active astronauts with 4 flights are Gennadiy Strekalov (NPO
Energiya), Aleksandr Serebrov (NPO Energiya/Flight Engineer, Mir
Complex), Robert Gibson (NASA Chief Astronaut), Steve Nagel (NASA
Astronaut Commander), Jerry Ross (NASA Mission Specialist), Norman
Thagard (NASA Mission Specialist), Ron Grabe (NASA Astronaut Commander),
and Story Musgrave (NASA Mission Specialist).
Musgrave will make 5 this year or early next on the HST repair mission;
Thagard is heavily tipped with a chance for the US mission to Mir in
a couple of years.
[Updated by jcm@urania.harvard.edu (Jonathan McDowell)]

(128) There was a much cheaper way of launching satellites, according to
McGill University experimenters in 1963. Developing an idea
proposed by Jules Verne, the McGill team used a rebored 50-foot-long
cannon from the battleship USS Washington to loft missiles to an

altitude of 65 miles.
By employing this technique to launch a Martlet rocket, the
McGill experimenters reckoned they could put a 50-pound payload
into orbit for less than the dollar equivalent of 18,000 pounds.
[Item from GUESSWORK that could have True or False. Below is answer.]
True, except that it turns out to be really hard to design a
useful payload that will survive the G-loads. I'm not sure if he was
at McGill, but the person who was involved in the project (HARP) was
a guy called Bull who was later involved in the Iraqi supergun and
ballistic missile projects and was recently killed. "Project HARP"
never put projectiles into ORBIT, just sent them to high ALTITUDES.
[Answered by jcm@urania.harvard.edu (Jonathan McDowell)]
(128a) Jules Verne was not the first guy to propose shooting cannonballs
into space! There's a famous illustration in Newton's *Principia
Mathematica* showing a cannon launching satellites...
[Bill Higgins-- Beam Jockey <HIGGINS@FNALV.FNAL.GOV>]

(129) A bit of trivia about Jim Lovell: He is the only US astronaut to go
twice to the moon and not land. (Apollo 8 and Apollo 13.) I guess
after Apollo13 he figured it just wasn't in the cards.

(130) The Manned orbiting Laboratory, simply a cylindrical lab attached to
a Gemini spacecraft, was to provide for 30-day missions to orbit
like the early soviet Salyut space stations. The MOL got so far as
having a mock-up launched atop a Titan IIIC rocket on November 3, 1966.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(131) The Gemini Spacecraft, mounted on the Manned Orbiting Laboratory as
if the latter were just the upper stage of the launcher, posed some
interesting problems as to how the crew were to transfer from the
Gemini spacecraft down to the cylindrical laboratory. There were
several techniques proposed to do those, namely:-
(1) cutting a hole through the heatshield for the astronauts to pass
hrough
(2) rotating Gemini so as the side hatch was attached directly,
(3) Using an inflatable transfer tunnel or
(4) Extravehicular Activity. (EVA - spacewalk.)
The one chosen was that of cutting a hold through the heat shield,
such that the mock-up that flew in 1966 with a hatch in the heat
shield - successfully recovered in the Atlantic Ocean.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(132) Charles Bassett and Elliott See, prime crew for Gemini 9, were
both killed in an aircraft accident on 28th February, 1966. Their
aircraft actually bounced off the building the Gemini spacecraft was
in, smashed into a carpark and exploded.
[Manned Spaceflight Log, Tim Furniss.]

(133) Models of the Vostok space capsule, which took the world's first
man into space, Yuri Gagarin, in 1961, was tested previously as
Sputniks 4, 5, 6, 9 and 10 and was successful 3 of these times.
[Manned Spaceflight Log, Tim Furniss.]

Sputnik was a Western name for the early Soviet unpiloted space satellites, known at that time in the USSR generically as Iskusstvenniy Sputnik Zemli (Artificial Earth Satellite). The spacecraft known in the West as Sputniks 4, 5, 6, 9 and 10 were announced at the time in the USSR as Korabl'-Sputnik 1, 2, 3, 4 and 5. Their internal names were Vostok type 1K nos. 3, 5, 6 and (the last two) Vostok type 3KA nos. 1 and 2. [Source: Vladimir Agapov, Moscow]. There were two other Korabl'-Sputnik launches which failed to reach orbit, so the success rate was 3 out of 7.
[jcm@urania.harvard.edu (Jonathan McDowell)]

(134) The first orbital flight of the Mercury spacecraft, Friendship 7, was flown by John Glenn. Unkown to Glenn, a serious problem seemed to be developing on the ground when controllers noticed that sensors indicated that his heat shield was loose. Mercury spacecraft had a neat air-bag which inflated just before splash down, popping off the heat shield in the process. Controllers to Glenn to keep his retro-pack on during descent. The pack was held in place by straps, and these were thought to be able to hang onto the heat shield during re-entry!
Luckily, the effort seemed to work. Although he saw major chunks of molten metal during re-entry he splashed-down safely.
[Manned Spaceflight Log, Tim Furniss.]

(135) Lying in Mercury capsule Faith 7 in May 1963, astronaut Gordon Cooper seemed the most relaxed of all the launch team. He even fell asleep during the countdown.
[Manned Spaceflight Log, Tim Furniss.]

(136) Pavel Belayev, of the Voskhod 2 mission in March of 1965, succumbed to a long and serious stomach illness on January 10, 1970, becoming the first spaceman to die of natural causes.
[Manned Spaceflight Log, Tim Furniss.]

(137) Gordon Cooper was the first man to enter orbit twice, with a flight on Mercury-Atlas 9 (The first Mercury-Atlas flight was no 6, with John Glenn), and Gemini 5.
[Manned Spaceflight Log, Tim Furniss.]
(137a) The first man in space was Gus Grissom, as he flew on MR-4/Liberty Bell Seven in 1961 (suborbital) and on Gemini 3 in 1965. Joe Walker made suborbital spaceflights on the X-15 in 1961 and 1963, becoming the first in space twice in Jul 1963 and three times in Aug 1963. Joe Engle made his second suborbital X-15 spaceflight a couple of weeks before Gemini V.
[The X-15 flights qualify if space is considered to start at 80 km, although even if you adopt the FAA boundary of 100 km Walker's two 1963 flights qualify and make him beat Grissom].
[jcm@urania.harvard.edu (Jonathan McDowell)]

(138) Neil Armstrong and David Scott had a close brush with death in Gemini 8, when a short circuit in the Gemini control system resulted in one thruster firing continuously. The spacecraft, at one stage,

was rotating at some 360 degrees per second. With the flying
bedstead incident and the 10-seconds of fuel left on Apollo 11, can
Neil Armstrong be considered a lucky man?
[Manned Spaceflight Log, Tim Furniss.]

(139) Lovell and Aldrin made the first observation of a solar eclipse from
space on Gemini 12, the last of the Gemini flights.
[Manned Spaceflight Log, Tim Furniss.]

(140) As the docking of Soyuz 4 and 5 was achieved on January 16, 1969,
the Soyuz 5 crew shouted "You raped me!". They were subsequently
reprimanded for their choice of words.
[Manned Spaceflight Log, Tim Furniss.]

(141) 3 cosmonauts were launched on Soyuz 5, and just 1 on Soyuz 4. On
landing, Soyuz 4 contained 3 and Soyuz 5 contained 4.
{At launch Soyuz 4 = Vladmir Shatalov, Soyuz 5 = Boris Volynov,
Alexei Yeliseyev and Yevgeni Khrunov.)
Yelisyev and Khronuv were yhe first men to return to Earth in a
craft other than the one in which they were launched.
[Manned Spaceflight Log, Tim Furniss.]

(142)Geoffrey Perry and his team of schoolboys at Kettering Grammar school,
using their small amateur radio setup, were able to tell the rest of
the world the precise point of the end of Soyuz 13 a good hour
before the Soviet statement. This was at a time when the Soviets
were trying to be completely open.
[Manned Spaceflight Log, Tim Furniss.]

(143) The first night-landing of a spacecraft came with the semi-emergency
landing of Soyuz 15 in 1974.
(I think this is so. Can anyone verify this?)

(144) Length Warning....
The joint Apollo-Soyuz mission was a success, but disaster struck
the American crew as they descended towards the recovery ship USS
New Orleans. Communications difficulties distracted Brand and he
forgot to operate the two Earth landing system switches which would
deploy the parachutes and deactivate the thursters. When the drogue
parachite did not come out, Brand manually commanded it to deploy, but
the swinging of the psacecraft caused the still-armed thrusters to
fire to correct the oscillations. Stafford noticed this and shut them
down, but by then the thrusters' nitrogen tetroxide propellant was
boiling off and entering the cabin via a pressure-relief valve. A
significant amount of the highly poisonous gas was drawn into the
capsule and the astronauts started to cough and choke. The command
module then hit the water 'like a ton of brocks' as Stafford
described it, and turned upside down. Stafford grabbed the oxygen
masks from a locker but by the time he reached Brand the command
module pilot was unconscious.
None of the astronauts was killed but the fast-acting gas had
turned their lungs white and blistered, and during their recuperation

a shadow was found on one of Slaytons Lungs. Fearing cancer, the surgeons decided to operate but found that it was a benign tumor. Had the shadow been found before the flight, Deke Slayton's grounding would most probably have held over and prevented him from making any flight at all.
[Manned Spaceflight Log, Tim Furniss.]

(145) Deke Slayton was the only original Mercury seven astronauts not to make a Mercury flight.
[Manned Spaceflight Log, Tim Furniss.]

(146) The back-up spacecraft for the Apollo-Soyuz flight (Apollo 18 and Soyuz 19) was used on the Soyuz 22 flight, with the androgynous docking equipment replaced by a photography canister.
[Manned Spaceflight Log, Tim Furniss.]

(147) It was the British who developed the 'minimum' satellite launchers of the 1950's. They found that a tank with hemispherical ends, but otherwise with no structural members, when pressurised could act as a load-bearing structure. A series of developments and cancellations in the US finally resulted in the development of the Atlas, with similar developments in the USSR. The astronauts launched on the Atlas in the Mercury project commented that the Atlas felt like a big wobbly baloon just prior to separation from the booster in orbit.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]

(148) The Gemini spacecraft needed an object to aim for in practising rendezvous techniques necessary for the Apollo missions. They used special Agena Docking Adaptor launched by an Atlas. The Adaptor was essentially a modified Agena stage. The adaptor to be used on Gemini 9 was different to the others, and unfortunately failed to release it's nose shroud correctly, resulting in the renowned 'Angry Alligator' pictures of the two half sections of the nose cose apart but unwilling to move any further.
[The Illustrated Encyclopedia of Space Technology. Kenneth Gatland.]
(148a) The GATV (Gemini Agena Target Vehicle) was an Agena D with a TDA (Target Docking Adapter) on the front. But the GATV for Gemini 9 fell in the ocean on launch. It was replaced by a backup called the ATDA (Augmented Target Docking Adapter) which was NOT a modified Agena - it was just the TDA with a cylindrical back end to mate it straight to the Atlas.
[jcm@urania.harvard.edu (Jonathan McDowell)]

The next few items, from 149 to 160, come from the Space Shuttle Main Engine Incredible Facts sheet put out by Rockwell International Rocketdyne Division. This was kindly forwarded to us by

(149) Fifty times a second, the SSME electronic controller evaluates itself and the engine and then adjusts the engine valves to obtain peak performance during the Shuttle Orbiter's launch and ascent.

(150) Although not much larger than an automobile engine, the SSME high-pressure fuel turbopump generates 100 horsepower for each pound of its weight, while an automobile generates about one-half horsepower for each pound of its weight.

(151) Each of the 122 high-pressure fuel pump turbine blades, about the size of a half-dollar, generates 700 horsepower while spinning at 37,000 rpm.

(152) Rocketdyne's Space Shuttle Main Engines operate at greater temperature extremes than any mechanical system in common use today. The fuel, liquid hydrogen, is -423 degrees Farenheit, the second coldest liquid on Earth, and when burned with liquid Oxygen, the temperature in the engine's combustion chamber reaches +6000 degrees Farenheit - higher than the boiling point of iron.

(153) The SSME high-pressure fuel turbopump main-shaft rotates at 37,000rpm compared to about 3,000rpm for an automobile engine operating at 60mph. (roughly 110km/h)

(154) The maximum equivalent horsepower developed by the three SSME's, is just over 37 million horsepower.

(155) If water, instead of fuel, were pumped by the three Rocketdyne Space Shuttle Main Engines, an average family-sized swimming pool could be drained in 25 seconds.

(156) One Rocketdyne Space Shuttle Main Engine generates enough thrust to maintain the flight of 2.5 Boeing 747 airliners.

(157) Discharge pressure of an SSME high-pressure fuel turbo-pump could send a column of liquid Hydrogen 180,000 feet into the air.

(158) The energy released by three of Rocketdyne's Space Shuttle Main Engines is equivalent to the output of 23 Hoover Dams.

(159) During launch and ascent, the three SSME's empty the half-million gallon exteranl tank in about 8.5 minutes.

(160) Even though Rocketdyne's Space Shuttle Main Engine weighs one-seventh as much as a locomotive engine, it's high pressure fuel pump alone delivers as much horsepower as 28 locomotives, while its high-pressure oxidizer delivers the equivalent horsepower for 11 more.

(161) The ACTS - Adavanced Communication Technology Satellite, launched on STS-51, will provide the largest transponder throughput ever - 1.0 gigibits per second (GBPS)
[STS-51 Payload Handbook]

(162) The space-suits worn by the original 7 Mercury astronauts were individually tailored to each astronaut. In Schirra's words they required "More alterations than a bridal gown."
[Life in Space, ISBN 0-8094-4900-5]

(163) The 27-year-old test pilot, Yuri Gagarin, of the Soviet Air Force,
was jumped from senior lieutenant to Major just before his
memorable Vostok flight.
[Life in Space, ISBN 0-8094-4900-5]

(164) Even though Gemini was by far a larger and more sophisticated
version of Mercury, A simplified sequencing system - and especially
the elimination of the scape tower - reduced the number of relays
from 220 in Mercury to 60 in Gemini.
[Life in Space, ISBN 0-8094-4900-5]

(165) Oddly, while everything but metal was badly burned during the tragic
Apollo 1 fire, a portion of the flight plan survived with only a few
pages singed.
[Life in Space, ISBN 0-8094-4900-5. Page 139, you can see the paper.]

(166) Each of the F-1 engines, used in the first stage of the Saturn V
Apollo moon launcher, was about as big as a two-and-a-hald-ton truck,
and used three tons of propellants a second.
[Life in Space, ISBN 0-8094-4900-5]

(167) The Saturn V absorbed the know-how and energies of 325,000 people
in 12,000 firms. As tall as a 36-story building, it had 11 engines.
The five engines that powered the first stage alone were designed to
develop 160 million horsepower, the capacity of 86 Hoover Dams.
[Life in Space, ISBN 0-8094-4900-5]

(168) The journalists recording the historic launch of Apollo 11 had to wait
some 15 seconds for the noise of the Saturn V ignition to reach them.
By that time, the rocket had already risen silently into the air.
[Life in Space, ISBN 0-8094-4900-5]

(169) When Soyuz 19 was launched in July of 1975, for the Apollo Soyuz
Test Project, the Soyuz was launched from the same pad that had
launched Sputnik some 18 years before.
[Life in Space, ISBN 0-8094-4900-5]

(170) NASA investigated at some stage the possibility of flying Columbia
unmanned so that they could remove the back-log of payloads waiting
to reach orbit. NASA had 13 old-specification SRBs in storgae at
the time. Unfortunately, this approach proved unfeasible.
[Space Flight News, September 1988.]

(171) The Mobile Service Structure (MST) at Cape Canaveral LC-40 is believed
to be the world's largest moving building. The 23 story (206 feet)
structure weighs 11.4 million pounds and can move at 50 feet/minute.
LC-40 is used to launch Titan-IV vehicles.
[gregb <gregb@tunfaire.den.mmc.com>]

(172) Sometimes even rocket technicians can overlook the obvious.
Case in point: Alan Shepard's Mercury-Redstone suborbital flight.
Because the expected duration of the flight was 15 minutes, none of
the engineers thought that Shepard would have to "relieve his
bladder" during that time. However, Shepard was strapped into the

Mercury capsule some 3 hours or so before liftoff. After a couple
of hours sitting on his back, Shepard felt the urge to go in a bad
way and asked for "permission to relieve his bladder." After some
debate, the engineers and medical team decided that it was OK for him
to pee in his spacesuit. And this is what he did.
I also suspect that NASA didn't want any negative publicity by
cancelling the launch. The newspapers would have had a field day:
(e.g. "Shepard has to pee, launch cancelled")
Starting with Gus Grissom's flight, strap on urine receptacles
were provided to the Mercury astronauts.
[Tom Wolfe, "The Right Stuff" -
from yantosca@bu-ast.bu.edu (Robert Yantosca)]

(173) Since September 1989, Mir has been occupied by cosmonauts continuously
without a break. This date would have been February 1987 except for
a break between Apr 27 and Sep 5 when Mir was left unattended for
awhile. In the future, we may look back and say that Sep 5, 1989,
was the last day that ALL of mankind was residing on Earth!
[Idea from Joe Dellinger <joe@montebello.soest.hawaii.edu> Dates and
Information from jcm@urania.harvard.edu (Jonathan McDowell)]

(174) The current shuttle flight computers are Quad redundant with a fifth
computer as a backup. They are AP-101S machines and were designed in
the mid 80's. Relatives of this computer also fly on the B-1, F-8,
AC-130 and B-52.
[Wingert@vnet.IBM.COM (Bret Wingert)]

(175) "every passing year brings the Solar System forty-three thousand
miles closer to Globular Cluster M13 in Hercules-- and still there
are some misfits who insist that there is no such thing
as progress." RANSOM K. FERN
[From burt@techbook.com (Burt Keeble)]

(176) Here's another bit of trivia for you: Neil Armstrong and (I think)
David Scott were in rather a pickle during their Gemini 8 mission
when a thruster continued firing after instructed to stop, putting
the spacecraft in a spin. I believe the mission was then curtailed
because of the lack of adequate thruster propellant for on-orbit
maneuvering and re-entry positioning. Evidently American television
audiences complained at the news reports interrupting the show they
were watching with news of this real-life space drama.
The show? Star Trek.
[From quagga@trystero.com]

(177) The top age set for the intake of the new group of astronauts for
the selection of the original Mercury Seven astronauts was set
at 40. The maximum height was set at 5ft, 11in and the weight
limit was 180lb.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(178) The first check of Military Test Pilot records revealed that 508
test pilots met the basic astronaut requirements. With suggestions
from commanding officers, this was reduced to 110. Further, with
the help of trainers and instructors, who'd brought these men up
to flight status, this was further reduced to 69. These people were
all invited to apply, but only 32 volunteered. These all went on
to undergo physical examinations and were reduced to 14. The selection
of the final 7 came at 2PM, April 9, 1959.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(179) John Glenn was the only Mercury astronaut with Red Hair, all the
others had brown hair.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(180) Alan Shepard was the tallest Mercury Astronaut at 5ft 11in, and
Gus Grissom the shortest at 5ft 7in.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(181) Gordon Cooper was the Youngest Mercury astronaut at 32 years of
age at selection, and John Glenn the oldest at 37.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(182) Alan Shepard was particular fond of Jos(233) Jim(233)nez, the brainchild of
comedian Bill Dana. Al found Jim(233)nez brand of humour such a handy
device for relaxing the troops when tension was building up before a
flight that he once arranged for a tape of some of Jos(233)'s dialogue
to be played in the Mercury control centre during a practice run.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(183) Alan Shepard was so fond of his white Corvette sports car that he
would often drive the 800miles from his home town to Cape Canaveral
rather than fly.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(184) The inside of the Apollo Command Module, on lift-off of the Mighty
Saturn V on Apollo 11, was quiet enough to listen to the radio!
[LIFTOFF - By Michael Collins.]

(185) The guidance experts had to aim the Apollo spacecraft some 40 degrees
of arc ahead of where the Moon was positioned at the time of launch.
[LIFTOFF - By Michael Collins.]

(186) A small controversy erupted from the Apollo 8 and 10 flight crews
who went to the moon but never actually landed. Apollo 8 reported
that the Moon was gray, while Apollo 10 claimed it was Brown.
[LIFTOFF - By Michael Collins.]

(187) The area picked out for the landing of Apollo 11 was expected to
be smooth - but instead it was littered with boulders the size of
Volkswagons.
[LIFTOFF - By Michael Collins.]

(188) The albedo of the Earth is some 4 times greater than that of the Moon.
[LIFTOFF - By Michael Collins.]

(189) Mike Collins bet Neil Armstrong a beer that they would land in the
Ocean a splash upside-down once they hit the water. The astronauts
were required to throw a breaker that released the parachutes, but
at the moment of splash down their hands are jerked away, and the
craft slowly turned over.
[LIFTOFF - By Michael Collins.]

(190) The first message received by the Test Pilots as to their impending
call for Astronaut service went as follows:-
"You will soon receive orders to OP-05 in Wasshington in
connection with a special project. Please do not discuss the matter
with anyone or speculate on the purpose of the orders, as any prior
identification of yourself with the project might prejudice that
project.
[We Seven - by the Astronauts Themselves, Simon and Schuster,
New York, 1962.]

(191) One of the early launches of the Space Shuttle (I don't recall the
number) was "scrubbed" because one of the five onboard computers
didn't come up "in sync" with the others. The interesting thing is
that a couple of days later one of the largest solar storms ever
observed occurred (with the resulting aurora borealis being visible
as far south as Dallas, Texas). If it weren't for the computer
"glitch" that prevented the launch, the Shuttle would have had to
make an emergency landing due to the radiation levels from the storm.
[From jones%azterra@sj.ate.slb.com (Clark Jones)]
{Awaiting the finer details for this one.)

(192) Walter Schirra helped start out the Sidewinder missile program at the
Navy Ordnance Station at China Lake, California. He actually got to
fire the first sidewinder missile at a drone target to see what
would happen. Flying an F3D night fighter, right after he let the
Sidewinder loose it went a little haywire and started a loop which
would chase his plane rather than the drone. So he made a fast
loop, trying to stay behind it. It succeeded, but his flight
engineer had a bad case of the 'clanks', which is pilot talk for
the 'shakes.'
[Walter M. Schirra, We Seven, 1962]

(193) The first two Mercury spacecraft carried with them some extra
equipment to help the rescue crews find them in the ocean - a chaff
dispenser and an underwater bomb.
[Donald K. Slayton, We Seven, 1962]

(194) One of the concerns of the Mercury astronauts was to know exactly what all the noises were as they were preparing from launch. They could hear absolutely everything, from moving the gantries outside to hearing the pipes creek as the fuel is loaded, the launcher shimmies as the engines are gimballed, and the rush of water on the pad just before ignition.
[Donald K. Slayton, We Seven, 1962]

(195) 30 seconds after the boosters of the Atlas launcher are dropped, the launcher for the Mercury flights, the Atlas was programmed to go into a 14 degree pitch back towards the Earth.
[Donald K. Slayton, We Seven, 1962]

(196) It was also apparent that on some occasions when the boosters dropped away from the Atlas launch vehicle that the Mercury capsule would be enveloped in flames for a second or tow. Something the astronauts needed to know so that they would not panic if this happened to them...
[Donald K. Slayton, We Seven, 1962][

(197) John Glenn, whose capsule was picked up by a destroyer while he was still inside, tried to crawl out through the top hatch of the Mercury capsule but found it easier to blow the hatch and come out that way. He did this on the deck of the destroyer and in the process badly bruised his knuckles - one of the prime pieces of evidence that backed up Gus Grissoms story on the mysterious hatch-blow that resulted in the loss of Gus's capsule.
[Donald K. Slayton, We Seven, 1962]

(198) Scott Carpenter, remembering that Gus Grissom lost his capsule when his side hatch blew, and that John glenn got hot staying inside his capsule, elected to go out through the top hatch and take his life raft with him. With perhaps the thinnest hips of the group, he found it fairly easy.
[Donald K. Slayton, We Seven, 1962]

(199) A survival knife was specifically contracted for the Mercury astronauts. They each had their own, but another was taped to the hatch on some of the flights. It was one of the strongets knives ever made, being hand forged and hand tempered from high grade Swedish steel that was so sturdy that it could be used like a chisel to cut through bolts.
[Goodon Coo[er Jr, We Seven, 1962]

(200) Al Shepards Mercury Capsule was the only capsule not to have a window through which he could admire the images of his home planet..
[Goodon Coo[er Jr, We Seven, 1962]

(201) Since the body tissue of pigs is very similar to that of humans, they strapped a live pig in a special contour couch - made the same way as the special moulded couches for the astronauts, to prove that the moulded couch would enable the astronauts to withstand higher impact G-loads when hitting the water than if they had a

normal, cushioned couch.
[John Glenn, We Seven, 1962.]

(202) One of the simplest tools that the Mercury astronauts took with them on their flights was a little rod known as a 'Swizzle Stick'. It was used basically as an extension of their fingers if they had to pressurise their suits and couldn't reahc one of the switches...
[John Glenn, We Seven, 1962.]

(203) The highest sustained G-load experienced by a human was when a Navy Lieutenant by the name of Carter Collins tested his own specially moulded Mercury couch, taking a load of 20.4G's for six seconds. The doctors who examined him revealed that some tiny blood vessels under the surface of the skin had ruptured, but that this was not a serious injury and did Collins no serious harm.
[John Glenn, We Seven, 1962.]
On Decmber 10th, 1954 Lt. Col. John P. Stapp experienced (with no permanent injury) almost 40 g deceleration on a rocket sled which reached a peak speed of 1017 km/hour before coming to a rapid stop. In 1958, Captain Eli L. Beeding experienced 83 g for 0.04 seconds. [Baker, David. The History of Manned Space Flight. New York: Crown Publishers, 1981. ISBN 0-517-54377-X. Page 26.] I don't know if these records have been broken since 1958.
[From kelvin@autodesk.com (John Walker)]
(Can anyone check on the 'Highest load' statement, I mean that was 30 years ago!]

(204) The gloves for the Mercury astronaut space suits were woven in a special way. Nearly all the fingers were woven curved, so that the astronauts to grasp things even when the suit was pressurised, except the middle finger on the left hand, which was woven straight so that the astronauts could still get at the little recessed buttons on the control panel.
[John Glenn, We Seven, 1962.]

(205) The Mercury astronauts discovered that the helmets that they wore fitted best when they had a five-day-old haircut. John Glen refined this a bit and had his hair trimmed every three days before his flight.
[John Glenn, We Seven, 1962.]

(206) Deke Slayton's spacesuit was the only one made different due to one small complaint. They changed one of the zippers to one side, and split it into two separate zippers becasue it pressed right against Deke's ADam's apple and was afraid that it might be rather painful for him on the flight.
[John Glenn, We Seven, 1962.]

(207) The atsronauts had a name for the two different types of G-forces they experienced whilst training on their large centrifuge. When thrust back into their sieat, they called it Eyeballs in, and when thrust out of their seat, with a negative G-force, they called

it, appropriately, eyeballs out.
[John Glenn, We Seven, 1962.]

(208) The main way the pilots could generate a zero-gravity environment was to go in a high parabolic flight. The way in which they kept the zero-gravity stable was to ignore the instruments and watch a little bright orange golf-ball on the end of a short nylon tether. They had to try and keep the golf-ball right in front of their face...
[Scott Carpenter, We Seven, 1962.]

(209) The Space Suit for the Mercury astronauts had a special neck-seal that they would use only if they were planning to dive into the ocean once they had returned. The seal prevented water from entering the suit through the helmet-ring and cause the astronaut to sink.
[Alan Shepard, We Seven, 1962.]

(210) The most dramatic failure of the Mercury program came in the testing stages when a Redstone and mock-up capsule were ready for launch. At "zero", the Redstone engines started and shut down straight away. In a fraction of a second the escape tower mounted on top of the capsule took off in a rush of flame, a parachute came out of the canister where the tower had stood, and another parachute came out again in quick succession.
It had turned out that the Mercury capsule had coped with the Redstone failure precisely, as the escape tower took off because of the lack of G-forces, and the parachute came out due to the altimeter detecting that it was below the poitn where it should have been activated on descent...
[John Glenn, We Seven, 1962.]

(211) The Mercury capsule, in the episode in item 210 above, began emitting the radio tracking signal like it should, and the two Navy P2V tracking planes 120miles away detected the beacon and started to home in on the launch pad.
[John Glenn, We Seven, 1962.]

(212) Ham, the Monkey that tested the Mercury capsule out for the astronauts, himself did not have an uneventful flight. First of all, an oxygen valve had jiggled loose during launch, nd kept the interior of the capsuel form pressuriZing. Fortunately the chamber that enclosed HAM worked fine and it kept him sealed up and safe during the flight. Also, the Redstone booster gave him an extra 1000 mph of speed. The escape tower detected th9is and gave him a further 800mph. As a result the capsule went 130miles further down range than it was supposed to.
[John Glenn, We Seven, 1962.]

(213) On the Morning of Alan Shepard's launch, the doctors noted that the nail on the 4th toe of his left foot was coming loose because someone had accidentally stepped on him, and he was peeling slightly from a recent sunburn.
[John Glenn, We Seven, 1962.]

(214) John Glenn left a little note for Alan Shepard in the Mercury capsule for when Alan would enter to make his flight. It said "No handball Playing in this area."
[John Glenn, We Seven, 1962.]

(215) The lanyard they used on the hatches of the Mercury capsule to detonate the explosive bolts was only 42 inches long. But the explosive charges were enough to through the capsule hatch a distance of 20 feet. The solution was to use some soft iron coils which linked the hatch to the capsule sill.
[Virgil Grissom, We Seven, 1962.]

(216) The capsule clock for the 2nd Merucry spacecraft suborbital flight actually rusted out, requiring a replacement quite rapidly even though there were practiaclly no clocks anywhere to be found.
[Virgil Grissom, We Seven, 1962.]

(217) A crack was painted on the side of the Liberty Bell 7, the capsule for Gus Grissom's flight. many people joked that it was the crack the caused the capsule to sink after the flight...
[Virgil Grissom, We Seven, 1962.]

(218) During reentry the capsule would slow from 17,500 mph to 270 mph and reach a temperature of 9.500 degrees Farenheit - close to the temperature of the sun.
[John Glenn, We Seven, 1962.]

(219) The speed of the Mercury capsule meant that the astronauts would experience sunrise and sunset some 18 times quicker than we do on the surface.
[John Glenn, We Seven, 1962.]

(220) It was of no concern to John Glenn that his capsule was designated as number 13...
[John Glenn, We Seven, 1962.]

(221) The flotation collar, installed on the outside of the Mercury capsule by frogmen after splash-down, was first used on the third mercury flight, the first orbital flight, of John glenn.
[Malcolm Scott Carpenter, We Seven, 1962.]

(222) The Mercury controllers initially insisted that should the astronauts lose voice contact with the ground that they shoud immediately abort the flight. The astronauts argued this point when they proved that they could communicate with the ground almost as effectively using morse code.
[Malcom Scott Carpenter, We Seven, 1962.]

(223) It was initially disconcerting for John Glenn, sitting 74 feet above the ground on the Atlas booster. It would sway slightly in a heavy gust of wind. In fact, he stated he was able to set the whole structure rocking himself, just be moving back and forth in the couch.
{John Glenn, We Seven, 1962.]

(224) One Mercury test flight resulted in the Atlas booster exploding during the period of maximum aerodynamic pressure, but the Mercury escape tower system worked just fine. The capsule came down in such fine condition that the engineers were able to use it again on another test flight.
Is this the first instance of reusability?
[John Glenn, We Seven, 1962.]

(225) A special instrmument was developed for the Mercury flights called an EXTINCTIONSPECTROPHOTOPOLERISCOPEOCCULOGRAVOGYROKYNETOMETER, but was called 'Voas meter' for short after Dr Robert Voas who developed it.
[John Glenn, We Seven, 1962.]

(226) Just 24 seconds before John Glenn made a transmission saying that he felt sections of his retro-packet breaking away during re-entry, Al Shepard had started to recommend to Glenn that he jettison the retro-pack as soon as the G's build up to 1 or 1.5. Glenn did not receive the message, however. The communication black-out had already set in.
[John Glenn, We Seven, 1962.]

(227) The men aboard the Noa were so pleased that it was their ship and not the aircraft carrier that had picked John Glenn and his capsule out of the water that they amde him a honorary member of the crew and presented him with a fifteen-dollar cheque as the February winner of the 'Sailor of the Month" contest. He then endorsed the cheque over to the ship's welfare fund.
[John Glenn, We Seven, 1962.]

(228) After the Mercury flight, John Glenn was asked to walk on a straight rail laid on the floor in order to check his balance. Colonel Chuck Yeager, the famous test pilot who first broke the sound barrier, suggested later that this test only proved that John Glenn had been brought up near some railroad tracks.
[John Glenn, We Seven, 1962.]

(229) One of the forms that John Glenn was required to fill out after the flight asked the question "Was there any unusual activity during this period?" to which Glenn answered "No, just a normal day in space."
[John Glenn, We Seven, 1962.]

(230) Poker Flat is the only university-owned sounding rocket range in the world. The 5,200-acre facility is located about 35 miles from UAF's main campus in Fairbanks. The range launched its first rocket in 1969.
[From NSMCA@acad3.alaska.edu]

(231) When the DCX made it's inaugural hop on (date ?) in 1993, it's touchdown was only 6 inches away from the predicted target.
[sci.space, August 1993]

(232) While watching the cameras for the launch, we were watching the Beanie cap (the cap on the top of the ET (External Tank)). When it

lifted in term count, it revealed a salamander underneath it. Upon seeing the sun, it scurried into the ET GO2 vents (at the very top of the ET), and a couple of minutes later the shuttle lifted off. I am sure it was quite a ride until the atmosphere ran out...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(233) In 1991 Dr. Helen Sharman became Britain's first person in space, spending eight days on board Russia's MIR space station, conducting a range of experiments and other work.
Selected from over 13,000 applicants, after listening and responding to a radio advertisement, Helen spent 18 months in training for the Juno mission. A Chemical Engineer by profession, Helen Sharman is considered a role model by anybody who strives for achievement, values, training, relies on teamwork, and believes that the sky is the limit !
[From charles.radley@pcohio.com (Charles Radley)]

(234)Pete Conrad's first words from the lunar surface after landing Apollo 12, the second landing mission, were "Whoopee! Man, that may have been a small one for Neil, but that's a long one for me!"
Conrad is 5'7" tall.
[Baker, 369. Michael Collins: Liftoff, p. 156,
from kelvin@autodesk.com (John Walker)].

(235) One of the less-than-great moments of NASA PR during the Apollo program was when, on Apollo 12 which, despite a lightning strike seconds after launch (item 20), made a pinpoint landing less than 200 meters from Surveyor 3. Less than two minutes into the first lunar EVA Pete Conrad accidentally pointed the TV camera (the first colour TV camera sent to the surface in Apollo) at the Sun. The vidicon tube burned out instantly. For the rest of the mission, only radio from the surface was available. [Baker, 369].
[from kelvin@autodesk.com (John Walker)]

(236) The first attempt to launch Gordon Cooper's Faith 7 on the final mission of Project Mercury was scrubbed on May 14, 1963 due to the failure of...a diesel engine! When the time came to retract the gantry at pad 14, the engine that pulls it wouldn't start. By the time the little engine that couldn't was coaxed into operation, problems had developed at the Bermuda tracking station which required the scrub. Cooper was launched successfully the next day.
[Baker, 160. From kelvin@autodesk.com (John Walker)]

(237) Turnaround time ain't what it used to be....
1. Gemini VI was originally scheduled to rendezvous and dock with an Agena target vehicle. On October 25, 1965, the Agena was launched on its Atlas booster but exploded six minutes and 20 seconds after launch. In only *38 days*, the mission was reprogrammed into the "Spirit of 76" mission in which Gemini VI-A would rendezvous with the Gemini VII long-duration mission. Gemini VI was launched from Pad 19 on December 4, 1965 and within *eight days* the Titan booster and Gemini VI were stacked on the same pad, checked out, and counted down

to launch on December 12. After a heart-stopping engine shutdown Gemini VI-A was successfully launched *three days* later, on December 15, 1965, [Baker, 219-221, 249]
2. After the loss of the Gemini VI Agena, NASA decided to build the Augmented Target Docking Adaptor (ATDA). It was approved, designed, manufactured, tested, and delivered to the Cape within *85 days*. When the Atlas booster for Gemini IX's Agena target failed on May 17, 1966, (see 148a) the ATDA was pressed into service. On June 1, 1966, only *15 days* after the failed Agena launch, another Atlas launched the ATDA and the redesignated Gemini IX-A was launched in pursuit on June 3. Unfortunately, the boost shroud failed to jettison completely, leaving the target an "angry alligator" (see 148).
[Baker, 236, 249. From kelvin@autodesk.com (John Walker)]

(238) During a Moon landing, the fuel burned by the descent stage propulsion system (8187 kg) was more than twice the dry weight of the entire Lunar Module (3900 kg).
[Baker, 299, 535. From kelvin@autodesk.com (John Walker)]

(239) Jules Verne's novels, the 1865 De la terre a la lune (From the Earth to the Moon), and 1870's Autour de la lune (Around the Moon) stand as monuments of prophecy in speculative fiction. Consider what Verne envisioned for his 19th century Moon mission versus what happened more than a century later.
a) The mission was launched from Florida.
b) There was a great rivalry between Florida and Texas to become the home of the mission.
c) The moon ship was "cylindro-conical" in shape, 9 feet in diameter and 12 feet tall, and fabricated of aluminium. (The Apollo CSM was a cylindro-conical shape, the CM was 13 feet in diameter and 11 feet tall, fabricated of aluminium.)
d) The crew consisted of three men.
e) Carbon dioxide was scrubbed from cabin air by postassium hydroxide. (Apollo used lithium hydroxide.)
f) A suborbital test flight of subscale ship with animals on-board was conducted.
g) The launcher cannon was named "Columbiad". (Apollo 11's command module was "Columbia".)
h) It was launched in December.
i) The first mission to the Moon did not land, but went into lunar orbit.
j) Rockets were fired to escape from lunar orbit into an Earth return trajectory.
k) Upon return to the Earth, the projectile landed in the Pacific Ocean, and was picked up by a ship of the U.S. Navy.
Verne did get a few things wrong. The "wagon-projectile" was launched by a 900 foot long cannon charged with 400,000 pounds of gun-cotton (nitrocellulose), not a rocket, was lit by gaslight, and carried hunting rifles, two dogs, a rooster and six hens, and fine French wine. And the entire Moon project cost $5,446,675, raised by a worldwide public subscription.

Neil Armstrong commented upon the remarkable parallels between Verne's vision and the reality of Apollo 11 in the last in-flight television broadcast as Apollo 11 was en-route to Earth. [Jules Verne: De la terre a la Lune (ISBN 2-253-00631-9), Autour de la Lune (ISBN 2-253-00587-8). Michael Collins: Liftoff, p. 12.]
[From kelvin@autodesk.com (John Walker)]

(240) One of my favorite stories (though you should probably check out the veracity of it) is in regards to the Apollo program. Several of the early launches were on Little Joe II rockets, which were solid fuel boosters, and were designed mainly to test the escape tower system. The Little Joe II rocket was described by one NASA official as being "the most reliable booster we've ever built". On the last such flight, the fuel charge in the Little Joe II shattered several seconds before the scheduled test of the escape tower, creating a true emergency for the escape tower to handle (the escape tower worked perfectly). The Little Joe II launches, by the way, took place at White Sands Missle range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]
The incident occurred on May 19th, 1965, when the third Little Joe II, scheduled for an 89 second burn to 35 km, where the escape system would be triggered, began uncommanded rolls seconds after launch. The Apollo launch escape system triggered, as designed, and successfully returned the boilerplate Command Module to the ground. The test was repeated on January 20th, 1966, on the fourth and final Little Joe II abort test and was a complete success; the escape system extracted the Command Module from the booster at 24 km and returned it safely to the ground.
[Baker, David. The History of Manned Space Flight. New York: Crown Publishers, Inc. 1981. ISBN 0-517-54377-X. Pages 261, 263.
From kelvin@autodesk.com.]

(241) At one time, the Gemini space craft was going to land on land rather than on water, with a rather bizzare inflatible "hang-glider" instead of parachutes. (I remember having a NASA publication when I was a kid that had drawings of this configuration. It even showed the storage compartment for the inflatible wing running between the two hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
The device was called the "Rogallo wing", named after its inventor Francis M. Rogallo of the Langley Research Center, who made a presentation to Bob Gilruth about it in early 1959. It became a key part of the concept of "Mercury Mk. II", which eventually became the Gemini program. North American Aviation received the contract to develop the Rogallo wing or "paraglider" in November 1961; the original mission schedule envisioned using it from the second launch and thereafter (the second launch was to be the first manned launch of Gemini). The development program ran into one problem after another: tangled lines, crashes, and schedule slips which would have made it impossible to use the paraglider before the seventh mission. With a total weight penalty of 360kg (including landing skids which

would deploy from the bottom of the spacecraft), and fiercely opposed by Chris Kraft's Flight Operations Division, the paraglider effort ground to a halt in 1964. An artifact of the paraglider remained on Gemini--the two point suspension system that deployed from between the crew hatches and tilted the spacecraft to a 55 degree angle for landing, even for parachute water landings. It is the deployment of this suspension system, not the parachute itself, which cracked Gus Grissom's helmet visor on Gemini 3, as mentioned in item 80(b)(i).
[Baker, David. The History of Manned Space Flight. New York: Crown Publishers, Inc., 1981. ISBN 0-517-54377-X. See pages 106-107, 175-176, and 201 including two pictures of the paraglider.
[From kelvin@autodesk.com.]

(242) The major change to the Atlas launcher for the Mercury flights of the early 60's was the Abort Sensing System. Not happy to call it ASS, the Air Force labelled it ASIS for Abort Sensing and Implementation System. The people at NASA, though, thought this was meant to be 'as is' meaning that it was basically an unmodified ICBM.
[From 'Lift Off' by Michael Collins, pg 34]

(243) For the construction of the Mercury spacecraft, NASA engineers had to learn how to weld Titanium 0.01 inches thick.
[From 'Lift Off' by Michael Collins, pg 36]

(244) Federal Prison specifications require a minimum cell space of some 475 cubic feet per inmate. Mercury had a habitable volume of 40 cubic feet, about the same size as a coffin.
[From 'Lift Off' by Michael Collins, pg 39]

(245) Years later, concerning the trend of sending Monkeys into orbit before the trained astronauts, Chuck Yeager commented 'I wouldn't want to sweep off Monkey shit before I sat down in that capsule.'
[From 'Lift Off' by Michael Collins, pg 46]

(246) Enos, the first Monkey to go into Orbit on board a Mercury Atlas, should have been awarded the NASA Exceptional Service Medal. Even though he carried out all his prescribed tasks, with his good behaviour rewarded with banana pellets and bad behaviour punished with electric shocks. Half way through the flight one of the levers malfunctioned, and ENOS received nearly 80 undeserved shocks.
[From 'Lift Off' by Michael Collins, pg 52]

(247) If Kennedy had said fly around the Moon instead of landing on it, the basic Mercury capsule could have been stretched enough to sustain a single astronaut on a circumlunar flight.
[From 'Lift Off' by Michael Collins, pg 67]

(248) The Gemini spacecraft had an interesting design flaw based on economics that annoyed all the fighter pilots. There was only one attitude controller, mounted between the two seats. Therefore the

man in the right seat had to train his hands to reverse roles.
[From 'Lift Off' by Michael Collins, pg 74]

(249) The first launch of Gemini 6 was aborted due to the self-destruction
of their Agena docking target. The second attempt, as they were
on their way to chase Gemini 7, also ended in an abort, but one
fraut with excitement. The clock, which signals the start of the
mission, was ticking over but there was silence as the engines did
not start. By all interpretations of the rules, Schirra and
Stafford should have ejected, but they held tight. It was later
found that a plastic dust cover had been carelessely left INSIDE
the engine. In all likelihood, the booster would not have had
enough thrust to get the spacecraft into orbit anyway!
[From 'Lift Off' by Michael Collins, pg 88,89]

(250) On their ascent into orbit, Young and Collins, on Gemini 10,
experienced an explosion of their first stage. Fortunately, it
was just after the ignition of the second stage blasting into
the top of the first, causing the oxidiser tank to explode.
[From 'Lift Off' by Michael Collins, pg 95]

(251) Each Solid Rocket Booster has a system tunnel that provides
protection and mechanical support for cables associated with the
electrical and instrumentation subsystem. The tunnel extends almost
the entire length of the booster. They Weigh 457kg, are around
41metres in length, 25cm wide and 10cm thick. They are constructed
of an aluminium alloy slightly thicker than a filing cabinet wall.
[NASA - Space Shuttle News Reference.]

(252) Despite the complexity of the Space Shuttle Main Engines, effectively
the entire engine operation is controlled by 5 valves:-
The Main Oxidizer Valve, the Main Fuel Valve, the Oxidizer
Preburner Oxidizer Valve, the Fuel Preburner Oxidizer Valve, and the
Chamber Coolant Valve.
[NASA - Space Shuttle News Reference.]

(253) When Johna Kepler specualted on a journey to the Moon, writing a
fanciful account of a sleeping man transported to the Moon by Demons,
he almost caused his mother to be executed as a witch.
[From 'Lift Off' by Michael Collins, pg 116]

(254) One critical factor in determine the stability of a Rocket Engine
was it's ability to recover from a momentary abnormality and
restore itself to safe, stable combustion. But how to determine this
on the test stand? Clever engineers induced combustion instability
by using 'bombs', explosive charges deliberately set off inside a
thrust chamber to see how the engine would react to a near
instantaneous disruption of smooth, controlled burning.
[From 'Lift Off' by Michael Collins, pg 124]

(255) Inside the F-1 engine, engineers used Rene 41 for part of a trubine,
the same metal used on the Mercury capsule to protect the spacecraft

against re-entry heating.
[From 'Lift Off' by Michael Collins, pg 125]

(256) Douglas Aircraft was unsure of what material to use to insulate the thrid stage Hydrogen Tank of the massive Saturn V Launch Vehicle. Originally they thought Balsa Wood was superior to any Man-Made material, but an analyisis of the available supply of Balsa Wood showed that every balsa tree in South America would have to be denuded to supply sufficient insulation for the Saturn fleet. Instead, polyurethane was poured into fibreglass forms to produce waffle-like tiles that were glued inside each Hydrogen tank - 43,000 tiles per tank.
[From 'Lift Off' by Michael Collins, pg 125]

(257) Once a tank was filled with Hydrogen it had to be inspected for leaks, and that was a tricky procedure. A jet of escaping hydrogen was apt to combine with oxygen in the air and burn, but in daylight the flame would be invisible. Douglas used infrared cameras on its test stands to detect any leaks, but the cameras had blind spots, so men were sent around the scaffolding, wearing protective clothing and holding brooms out in front of them. If a broom suddenly burst into flame, there was a leak!.
[From 'Lift Off' by Michael Collins, pg 126]

(258) If all the data from the Telemetry of the Saturn V were printed, it would fill 300 pages each second.
[From 'Lift Off' by Michael Collins, pg 127]

(259) The descent engine of the Apollo Lunar Module was the first throttle controlled engine to be used by a spacecraft.
[From 'Lift Off' by Michael Collins, pg 144]

(260) The Sep 16, 1993, Mir EVA overlapped with the spacewalk from Discovery for 1h 43 min; this is the first time 4 people have been spacewalking at once, and the first time American and Russian cosmonauts have spacewalked at the same time. (An earlier pair of EVAs this year, Manakov/Poleshchuk on Jun 18 and Low/Wisoff on Jun 25, were separated by only a week; otherwise there have been only three cases of Russian and American spacewalks occuring within a month of each other. The Russians made the first spacewalk but then only made one more between 1965 and 1977, by which time the Gemini, Apollo and Skylab programs were long over; then they started doing lots of EVAs from Salyut and Mir, but until this year spacewalks from the Shuttle were relatively rare.)
[from jcm@urania.harvard.edu (Jonathan McDowell)]

(261) I was a volunteer on the KC-135 Vomit Comet for medical experiments the same time that the ladies were volunteering to test the 1st Shuttle toilet in 0g. When my tests were over I went back to one of the seats in the rear of the plane and sat. Soon after, the woman who ran the experiments on me asked if I was sitting on something. Sure enough in the seat with me was a large ziplock baggie containing

a clear narrow plastic funnel with tubing. This was her personal connection to the toilet. As she explained it to me she told me the prototype was called the Female Urine Collection Kit. We both agreed that the name would have to be changed before operational use.
[rlove@raptor.rmNUG.ORG (Robert B. Love)]

(262) Due to the 5psi atmosphere of Skylab, The crews of Skylab learned that - even shouting - their voices didn't carry and they were forced to use the intercom if more than 10 feet apart.
[From 'Lift Off' by Michael Collins, pg 166]

(263) The chamber of the Space Shuttle Main Engines is some 3000psi - over three times that of the Saturn V's engines.
[From 'Lift Off' by Michael Collins, pg 209]

(264) After it's first flight, Columbia was found to have over 400 nicks, scrapes and gouges in its fragile tiles.
[From 'Lift Off' by Michael Collins, pg 221]

(265) It takes more than a half a mile of welds to put a Space Shuttle External Tank together.
[National Geographic, Mar 1981, pg 332]
The precise length is 917.6m
[Space Shuttle News reference, NASA]

(266) A bolt, which attaches the Solid Rocket Booster to the External Tank, is made of a special high-grade steel which is similar in composition and design to the separation bolt of the Viking Mars orbiter and lander.
[Space Shuttle News Reference, NASA]

(267) Although no larger than the fuel cells used on the Apollo Program, each fuel cell on the Space Shuttle has six times the output of the Apollo fuel cells.
[Space Shuttle News Reference, NASA]

(268) Accumulated water and other fluids in the Space Shuttle Orbiter drain out through the Limbar holes (much like limbar holes in frames along the keel of a boat) to the lowest point for removal.
[Space Shuttle News Reference, NASA]

(269) The remotest object visible with the naked eye is the great galaxy in Andromeda known as Messier 31.
[Guiness Book of Records, 1992 Softcover edition.]

(270) The first double quasar (0957+56) among 1500 known quasars was announced in May 1980.
[Guiness Book of Records, 1992 Softcover edition.]

(271) The Nearest star to Earth, excepting the Sun, is the very faint Proxima Centauri, discovered in 1915, which is about 4.225 light years away.
[Guiness Book of Records, 1992 Softcover edition.]

(272) The nearest star visible to the naked eye is the binary Alpha Centauri or Rigel Kentaurus at 4.35 light years distant.
[Guiness Book of Records, 1992 Softcover edition.]

(273) The Alpha Centauri binary will reach a minimum distance from Earth of 2.84 light years in the year 29700 AD.
[Guiness Book of Records, 1992 Softcover edition.]

(274) The present distance of the Solar System from the centre of the Milky Way galaxy is 27 700 light years and it will reach a minimum distance of 27 600 light years (perigalacticon) in about 15 million years' time.
[Guiness Book of Records, 1992 Softcover edition.]

(275) The AVERAGE velocity of the Sun and nearby stars has been calculated to be 792 000km/h. However, the Sun's actual velocity is 97 200km/h faster than this average.
[Guiness Book of Records, 1992 Softcover edition.]

(276) The largest known star is Betelgeux at 310 light years distance, and is 500 times larger than the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(277) The heaviest known star is Eta Carinae, 9100 light-years distant in the Carinae Nebula in our own Galaxy. It has a mass some 200 times our own Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(278) The smallest known star appears to be the White Dwarf L362-81 with an estimated diameter of only 5600 km.
[Guiness Book of Records, 1992 Softcover edition.]

(279) The lightest and dimmest known star is RG 0058.8-2807, with a mass of only 0.014 that of our Sun, and a total luminosity of only 0.0021 that of the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(280) The brightest Supernova ever seen by historic Man is believed to be SN 1006, noted in April 1006 near Beta Lupi. It f;ared for two years and attained a magnitude of -9 to -10!
[Guiness Book of Records, 1992 Softcover edition.]

(281) The largest constellation is Hydra which covers 6.3% of the hemisphere and contains 68 naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(282) The constellation Centaur, ranking 9th in area, has at least 94 naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(283) The smallest constellation is Crux Australis with an area of only 0.16% of the whole sky.
[Guiness Book of Records, 1992 Softcover edition.]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
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(1) Grissom had a reputation for speaking Army Creole. Lines like
"F***ing A, Well Told, Bubba". It was a factor in the vote for
Sheperd being the first man up. The other astronauts were kind of
concerned about Grissoms First words.

(2) Weightless intercourse - "Sex in Space" - is said to have been
accomplished in both the US and Soviet/Russian Space programs. This
has been said to have happened not once but as much as 7 times!
[The Three Dolphin Club, G Harry Stine, Analog Science Fiction/
Science Fact.]

(3) In terms of complexity, it is interesting to gain a comparison of the
Shuttle and Apollo systems. It has been estimated that the whole
Service Module is only the equivalent of each one of the Orbital
Maneouvering Systems on the rear of each orbiter.

(4) In 1969, when Donald Buchanan - KSC's chief of engineering - travelled
to London to accept the Diamond Jubilee trophy of the Royal
Automobile Club for "The Outstanding Contribution on the field of
Automotive Transport", he carried with him a small scale model of
the crawler vehicle (He was accepting the award because of the Crawler
Trans-porter). On seeing the model in Buchanan's suitcase, the
customs officier on duty at the airport - obviously unaware of the
real-life crawler - earnestly enquired if he was a travelling
salesman selling farm machinery!

(5) Von Braun was one of the most far-sighted men in human history. The
rocket he designed for the V-2 worked perfectly, he told a friend
when the first V-2's hit London, except that they landed on the
wrong planet!
[Life in Space, ISBN 0-8094-4900-5]

(6) Gemini 3's lift-off was reportedly so smooth that neither of the
astronauts felt anything - the starting of the mission clock
on the instrument panel alerted them.
[Life in Space, ISBN 0-8094-4900-5]

(7) One of the CapCom's during the recovery of (I think) Apollo 15 said
(roughly): "we can bring these things down in Clear Lake if we want".
[aws@iti.org (Allen W. Sherzer)]

(8) I think it was an interview with Sally Ride when someone asked her
about the underclothes that she wears in space. She said that she did
not bother wearing a bra in space!

[From wepaim@itwol.bhp.com.au (Mark Paine)]

(9) There is also another story of the original white ET's. Apparently the
white (for some reason only white and not the current brown / orange
ones) attracted woodpeckers. They LOVED the tank, and they loved
pecking on it. Probably not a bright idea, but since they are birds...
[From HOLLIS@TITAN.KSC.NASA.GOV]

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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
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(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

The next three were from a TRUE or FALSE quizz in Space Flight News April
1989 issue. The answers weren't published (as far as I can find) so
I am including the items here so that someone else can tell us which
are true and which are false.

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.

"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(8) One of my favorite stories (though you should probably check out the
veracity of it) is in regards to the Apollo program. Several of the
early launches were on Little Joe II rockets, which were solid fuel
boosters, and were designed mainly to test the escape tower system.
The Little Joe II rocket was described by one NASA official as being
"the most reliable booster we've ever built". On the last such flight,
the fuel charge in the Little Joe II shattered several seconds before
the scheduled test of the escape tower, creating a true emergency for
the escape tower to handle (the escape tower worked perfectly). The
Little Joe II launches, by the way, took place at White Sands Missle
range.
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(9) Is there any truth to the rumor that Dick Nixon ordered all plans for
the Saturn V destroyed so that they wouldn't fall into the hands of
the Soviets?
[jones%azterra@sj.ate.slb.com (Clark Jones)]

(10) At one time, the Gemini space craft was going to land on land rather
than on water, with a rather bizzare inflatible "hang-glider" instead
of parachutes. (I remember having a NASA publication when I was a
kid that had drawings of this configuration. It even showed the
storage compartment for the inflatible wing running between the two
hatches.)
[jones%azterra@sj.ate.slb.com (Clark Jones)]
(Can anyone come up with some sources for backing up/refuting the last
three items?)

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* *
* Trivia List Submission Policies and Guidelines *
* *
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The policies dictating what should be included in this file are
subject to change at any notice, but will hopefully remain solid around the
following short guidelines:-

(1) Comparisons of Space Hardware to common concepts or everyday
objects. (eg the list of interesting facts on the strength
and capabilities of the Space Shuttle Main Engines)
(2) Similar to No.1, comparisons of modern hardware to older hardware
(eg how a Mercury capsule could fit inside the engine shroud
of the F-1 engines on the Saturn V)
(3) Plans of what different space agencies were once planning but
have since cancelled.
(4) Stories of lost opportunities from funding cuts.
(5) Personal accounts of what 'Human Space Travellers' (Cosmonauts,
Astronauts, Euronauts etc) have said or done that are
suprising, astounding or otherwise interesting in some way.
(6) Miscellaneous pieces of trivia with a sufficiently high interest
quotient. (ie, something likely to lift the eyebrows of
perhaps just a few people and warrant a real 'Oh WOW, I
didn't know that!'.
(7) Rumours of a justifiable nature. This will need a separate
section to be included in the list (To be set aside from
trivia FACTS).

Policy on excessive rumours and untruths:-

As it is planned for this list to be updated regularly, additions to
this file will hopefully come at a regular rate. Posting to newsgroups
sci.space, sci.space.shuttle, sci.astro and perhaps the new space group of
the ham.radio collection of groups will hopefully arouse enough regular
interest to keep this list growing.
Additions will then undergo minor scrutiny before inclusion in the
list. If the moderator or any other person on the net have any reason to
believe that a certain item of trivia may be false, then the item will be
included in an 'Un-justified' group in this list. The owner of the

information may then be asked to include some sort of evidence of information - whether it be references to works of other people, or working-out from scratch - then this will be investigated to determine whether the item has been doctored in any way.
We hope to have our facts as found on record in at least one place around the globe, and our rumours as heard by at least a number of people.

****
* Submissions: *
****

For these reasons, we have a rough guideline for the format of submissions to this list, namely:-

(1) In the subject header for the message, please include somewhere 'Submission for Trivia List'. You may include a brief title or whatever if you can squash it in. No need for a summary unless you are just accustomed to doing them.
(2) FACTS: Please include some source information for your information. This sort of thing usually depends on the circumstance. Cost comparisons etc would prefer sources for values, Size comparisons would prefer measurements and where they were quoted from etc. If the trivia isn't yours, then let us know from where it came.
(3) RUMOURS: It is hard to justify this one, but let us know if it is complete hear-say or if it is based on some report issued by whatever agency on the efficiency of whatever you think appropriate. Just give us some background - if you could.

It's not like we'll be critical or anything - beggars can't be choosers - but it would help in the final organisation of everything if these simple guides were included.
We'd like to include that, if the work gets hard, we'll issue a semi-formal-submission-format so that we can semi-automate the process.

****
* UPDATE LOG: *
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28/6/93 - Started the list for the first time, created the initial policy guidelines and posted the request for more trivia information to newsgroups sci.space, sci.space.shuttle, sci.astro and rec.radio.amateur.space. (It may prove necessary to remove this last group from the list if any of their group mentions that it is an inappropriate item for their group. The initial posting is to perhaps include some interesting trivia from their own personal experience, so for the moment it is to be included.)
Only items so far included are those from the Trivia Section of the 'Newcastle Space Fronter Society Update' - a privately distributed newsletter of the Newcastle chapter of the National Space Society of Australia, the Australian Network of Chapters of the National Space Society. (That's a lot to

get down into one paragraph!)

17/7/93 - Changed the layout of the List by basically inverting the submission information - from top to bottom to make it better to read. Also, have received suggestions of posting only an updated list, but rather I think I'll include a list of changes in the first few lines, and people can still read through the rest if they've never seen it before. Included new ones from Shuttle by Nigel MacKnight, and also from the BIS Spaceflight Magazine.

July Sometime, 1993 - Split the lis into two files, one the complete list and the other an Updated Only. The Update is posted regularly to the newsgroups, and the full list posted perhaps bimonthly. The list was also submitted for storage, and accepted, at ames.arc.nasa.gov and krakatoa.jsc.nasa.gov.

24/7/93 - Completed an excellent book called We Seven by the Mercury astronauts themselves. Whilst full of information, about 80 items were found that had to be reduced due to absolute triviality or duplication in other items. All up about 40 items were added from this source. About to embark on Michael Collin's 'LiftOff' and then further Buzz Aldrin's book.

=-=
Luke Plaizier - Entomological Toxophilist Extraordinaire
Editor - Newcastle Space Frontier Society UPDATE
Moderator - SPACE TRIVIA LIST
lukpla@scorch.apana.org.au
=-

343. ORBS$323.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 13:37:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-323.o.1993@ampr.org>
Source record: 28603
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-323.O
Orbital Elements 323.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX November 19, 1993
BID: $ORBS-323.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93321.57691393
Element set: 211
Inclination: 27.1956 deg
RA of node: 355.7539 deg
Eccentricity: 0.6019652
Arg of perigee: 131.0023 deg
Mean anomaly: 299.1524 deg
Mean motion: 2.05880635 rev/day
Decay rate: -1.12e-06 rev/day^2
Epoch rev: 7841
Checksum: 293

Satellite: UO-11
Catalog number: 14781
Epoch time: 93320.59791365
Element set: 612
Inclination: 97.7971 deg
RA of node: 340.1743 deg
Eccentricity: 0.0010901
Arg of perigee: 227.3657 deg
Mean anomaly: 132.6634 deg
Mean motion: 14.69084435 rev/day
Decay rate: 2.24e-06 rev/day^2
Epoch rev: 51909
Checksum: 310

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93320.53837545
Element set: 812
Inclination: 82.9209 deg
RA of node: 126.0240 deg
Eccentricity: 0.0010352
Arg of perigee: 256.4589 deg
```

Mean anomaly: 103.5413 deg
Mean motion: 13.72326438 rev/day
Decay rate: 6.1e-07 rev/day^2
Epoch rev: 32074
Checksum: 277

Satellite: AO-13
Catalog number: 19216
Epoch time: 93315.34314830
Element set: 813
Inclination: 57.8997 deg
RA of node: 284.7483 deg
Eccentricity: 0.7226538
Arg of perigee: 327.9276 deg
Mean anomaly: 3.4613 deg
Mean motion: 2.09719999 rev/day
Decay rate: -5.3e-07 rev/day^2
Epoch rev: 4143
Checksum: 336

Satellite: FO-20
Catalog number: 20480
Epoch time: 93310.07362541
Element set: 607
Inclination: 99.0217 deg
RA of node: 139.2984 deg
Eccentricity: 0.0541030
Arg of perigee: 125.0547 deg
Mean anomaly: 240.2545 deg
Mean motion: 12.83221816 rev/day
Decay rate: -5.0e-08 rev/day^2
Epoch rev: 17551
Checksum: 267

Satellite: AO-21
Catalog number: 21087
Epoch time: 93320.47796564
Element set: 368
Inclination: 82.9418 deg
RA of node: 300.1208 deg
Eccentricity: 0.0034449
Arg of perigee: 319.1873 deg
Mean anomaly: 40.6687 deg
Mean motion: 13.74528168 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 14036
Checksum: 318

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93317.61990766

Element set: 612
Inclination: 82.9233 deg
RA of node: 171.3110 deg
Eccentricity: 0.0029494
Arg of perigee: 351.2997 deg
Mean anomaly: 8.7626 deg
Mean motion: 13.74029180 rev/day
Decay rate: 4.0e-08 rev/day^2
Epoch rev: 13904
Checksum: 305

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93319.82294071
Element set: 209
Inclination: 1.4256 deg
RA of node: 113.1022 deg
Eccentricity: 0.2930832
Arg of perigee: 161.7997 deg
Mean anomaly: 211.8626 deg
Mean motion: 1.42202608 rev/day
Decay rate: -5.2e-07 rev/day^2
Epoch rev: 272
Checksum: 263

/EX

344. ORBS$323.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 13:40:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-323.d.1993@ampr.org>
Source record: 28604
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-323.D
Orbital Elements 323.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX November 19, 1993
BID: $ORBS-323.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93320.70053268
Element set: 912
Inclination: 98.6062 deg
RA of node: 43.2321 deg
Eccentricity: 0.0011712
Arg of perigee: 93.9046 deg
Mean anomaly: 266.3482 deg
Mean motion: 14.29803677 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 19922
Checksum: 290

Satellite: AO-16
Catalog number: 20439
Epoch time: 93320.27451247
Element set: 712
Inclination: 98.6124 deg
RA of node: 43.8287 deg
Eccentricity: 0.0012274
Arg of perigee: 95.5349 deg
Mean anomaly: 264.7257 deg
Mean motion: 14.29860785 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 19917
Checksum: 328

Satellite: DO-17
Catalog number: 20440
Epoch time: 93320.66928486
Element set: 712
Inclination: 98.6144 deg
RA of node: 44.4763 deg
Eccentricity: 0.0012250
Arg of perigee: 94.2945 deg
```

Mean anomaly: 265.9628 deg
Mean motion: 14.29997894 rev/day
Decay rate: 6.0e-07 rev/day^2
Epoch rev: 19924
Checksum: 339

Satellite: WO-18
Catalog number: 20441
Epoch time: 93320.22118847
Element set: 713
Inclination: 98.6142 deg
RA of node: 44.0490 deg
Eccentricity: 0.0012764
Arg of perigee: 95.8251 deg
Mean anomaly: 264.4402 deg
Mean motion: 14.29975696 rev/day
Decay rate: 5.7e-07 rev/day^2
Epoch rev: 19918
Checksum: 313

Satellite: LO-19
Catalog number: 20442
Epoch time: 93320.70317511
Element set: 712
Inclination: 98.6151 deg
RA of node: 44.7345 deg
Eccentricity: 0.0013139
Arg of perigee: 93.7468 deg
Mean anomaly: 266.5215 deg
Mean motion: 14.30068015 rev/day
Decay rate: 6.1e-07 rev/day^2
Epoch rev: 19926
Checksum: 285

Satellite: UO-22
Catalog number: 21575
Epoch time: 93320.68042724
Element set: 412
Inclination: 98.4578 deg
RA of node: 34.2356 deg
Eccentricity: 0.0006986
Arg of perigee: 200.1876 deg
Mean anomaly: 159.9027 deg
Mean motion: 14.36865218 rev/day
Decay rate: 1.05e-06 rev/day^2
Epoch rev: 12256
Checksum: 307

Satellite: KO-23
Catalog number: 22077
Epoch time: 93320.59051504

Element set: 309
Inclination: 66.0900 deg
RA of node: 5.1031 deg
Eccentricity: 0.0005093
Arg of perigee: 341.0856 deg
Mean anomaly: 18.9960 deg
Mean motion: 12.86281800 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 5944
Checksum: 250

Satellite: AO-27
Catalog number: 22825
Epoch time: 93320.66241511
Element set: 211
Inclination: 98.6771 deg
RA of node: 33.3777 deg
Eccentricity: 0.0009303
Arg of perigee: 106.2143 deg
Mean anomaly: 254.0076 deg
Mean motion: 14.27590086 rev/day
Decay rate: 7.0e-07 rev/day^2
Epoch rev: 736
Checksum: 275

Satellite: IO-26
Catalog number: 22826
Epoch time: 93320.65872634
Element set: 212
Inclination: 98.6768 deg
RA of node: 33.3808 deg
Eccentricity: 0.0009869
Arg of perigee: 107.8468 deg
Mean anomaly: 252.3794 deg
Mean motion: 14.27692506 rev/day
Decay rate: 7.3e-07 rev/day^2
Epoch rev: 736
Checksum: 337

Satellite: KO-25
Catalog number: 22830
Epoch time: 93319.73628661
Element set: 212
Inclination: 98.5788 deg
RA of node: 31.9792 deg
Eccentricity: 0.0012486
Arg of perigee: 82.0123 deg
Mean anomaly: 278.2466 deg
Mean motion: 14.28016160 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 723

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Checksum: 301

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345. ORBS$323.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 13:44:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-323.w.1993@ampr.org>
Source record: 28605
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-323.W
Orbital Elements 323.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX November 19, 1993
BID: $ORBS-323.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93321.67817478
Element set: 612
Inclination: 99.0821 deg
RA of node: 4.3682 deg
Eccentricity: 0.0015882
Arg of perigee: 95.7490 deg
Mean anomaly: 264.5523 deg
Mean motion: 14.13562457 rev/day
Decay rate: 1.05e-06 rev/day^2
Epoch rev: 46046
Checksum: 314

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93315.75032400
Element set: 509
Inclination: 98.5140 deg
RA of node: 326.3695 deg
Eccentricity: 0.0012248
Arg of perigee: 244.0314 deg
Mean anomaly: 115.9574 deg
Mean motion: 14.24842726 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 37164
Checksum: 297

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93319.86072672
Element set: 211
Inclination: 82.5421 deg
RA of node: 78.2816 deg
Eccentricity: 0.0017893
Arg of perigee: 61.8037 deg
```

Mean anomaly: 298.4910 deg
Mean motion: 13.84697554 rev/day
Decay rate: 6.5e-07 rev/day^2
Epoch rev: 29283
Checksum: 334

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93319.83299665
Element set: 211
Inclination: 82.5384 deg
RA of node: 114.6617 deg
Eccentricity: 0.0017926
Arg of perigee: 77.8342 deg
Mean anomaly: 282.4811 deg
Mean motion: 13.16962335 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25517
Checksum: 319

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93315.67695101
Element set: 409
Inclination: 99.1508 deg
RA of node: 294.5292 deg
Eccentricity: 0.0012515
Arg of perigee: 27.3413 deg
Mean anomaly: 332.8509 deg
Mean motion: 14.12931327 rev/day
Decay rate: 1.65e-06 rev/day^2
Epoch rev: 26450
Checksum: 291

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93320.51300057
Element set: 212
Inclination: 82.5191 deg
RA of node: 313.4772 deg
Eccentricity: 0.0015680
Arg of perigee: 100.7230 deg
Mean anomaly: 259.5690 deg
Mean motion: 13.84349177 rev/day
Decay rate: 4.5e-07 rev/day^2
Epoch rev: 23826
Checksum: 288

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93320.32104910

Element set: 913
Inclination: 82.5525 deg
RA of node: 57.5423 deg
Eccentricity: 0.0017403
Arg of perigee: 95.7518 deg
Mean anomaly: 264.5640 deg
Mean motion: 13.16021908 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19511
Checksum: 262

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93320.64092393
Element set: 712
Inclination: 82.5491 deg
RA of node: 17.2997 deg
Eccentricity: 0.0016711
Arg of perigee: 28.5586 deg
Mean anomaly: 331.6512 deg
Mean motion: 13.84181803 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17121
Checksum: 291

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93314.27490495
Element set: 816
Inclination: 98.8528 deg
RA of node: 336.2622 deg
Eccentricity: 0.0014224
Arg of perigee: 264.8255 deg
Mean anomaly: 95.1288 deg
Mean motion: 14.01329924 rev/day
Decay rate: 3.52e-06 rev/day^2
Epoch rev: 16304
Checksum: 314

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93320.47980517
Element set: 711
Inclination: 82.5249 deg
RA of node: 315.2181 deg
Eccentricity: 0.0011921
Arg of perigee: 288.0238 deg
Mean anomaly: 71.9627 deg
Mean motion: 13.83563968 rev/day
Decay rate: 5.2e-07 rev/day^2
Epoch rev: 15834

Checksum: 308

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93320.51833216
Element set: 615
Inclination: 82.5409 deg
RA of node: 319.9466 deg
Eccentricity: 0.0013471
Arg of perigee: 2.5209 deg
Mean anomaly: 357.5653 deg
Mean motion: 13.16456371 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12337
Checksum: 280

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93315.68793624
Element set: 816
Inclination: 98.6427 deg
RA of node: 343.0215 deg
Eccentricity: 0.0013434
Arg of perigee: 143.1680 deg
Mean anomaly: 217.0407 deg
Mean motion: 14.22331177 rev/day
Decay rate: 1.76e-06 rev/day^2
Epoch rev: 12961
Checksum: 285

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93320.38880675
Element set: 612
Inclination: 82.5551 deg
RA of node: 267.0163 deg
Eccentricity: 0.0014334
Arg of perigee: 12.2322 deg
Mean anomaly: 347.9178 deg
Mean motion: 13.16825934 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10845
Checksum: 293

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93320.66678128
Element set: 211
Inclination: 82.5521 deg
RA of node: 14.8526 deg
Eccentricity: 0.0023798

```
Arg of perigee: 100.3379 deg
Mean anomaly: 260.0455 deg
Mean motion: 13.82991168 rev/day
Decay rate: 3.3e-07 rev/day^2
Epoch rev: 1071
Checksum: 288

/EX
```

346. ORBS$323.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 13:46:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-323.m.1993@ampr.org>
Source record: 28606
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-323.M
Orbital Elements 323.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX November 19, 1993
BID: $ORBS-323.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93321.57070583
Element set: 586
Inclination: 51.6139 deg
RA of node: 168.8603 deg
Eccentricity: 0.0005214
Arg of perigee: 358.7317 deg
Mean anomaly: 0.6246 deg
Mean motion: 15.58545846 rev/day
Decay rate: 7.939e-05 rev/day^2
Epoch rev: 44304
Checksum: 317

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93320.38852573
Element set: 362
Inclination: 28.4687 deg
RA of node: 163.2233 deg
Eccentricity: 0.0004748
Arg of perigee: 200.0009 deg
Mean anomaly: 160.0464 deg
Mean motion: 14.92922012 rev/day
Decay rate: 7.48e-06 rev/day^2
Epoch rev: 19427
Checksum: 277

Satellite: GRO
Catalog number: 21225
Epoch time: 93321.24933334
Element set: 222
Inclination: 28.4618 deg
RA of node: 264.6526 deg
Eccentricity: 0.0074975
Arg of perigee: 90.1642 deg
```

Mean anomaly: 270.7885 deg
Mean motion: 15.58731637 rev/day
Decay rate: 1.8416e-04 rev/day^2
Epoch rev: 2420
Checksum: 299

Satellite: UARS
Catalog number: 21701
Epoch time: 93315.59270845
Element set: 412
Inclination: 56.9842 deg
RA of node: 310.8939 deg
Eccentricity: 0.0005642
Arg of perigee: 92.8950 deg
Mean anomaly: 267.4094 deg
Mean motion: 14.96195848 rev/day
Decay rate: -1.996e-05 rev/day^2
Epoch rev: 11836
Checksum: 336

Satellite: POSAT
Catalog number: 22829
Epoch time: 93289.11726978
Element set: 204
Inclination: 98.6763 deg
RA of node: 2.0610 deg
Eccentricity: 0.0010043
Arg of perigee: 184.4594 deg
Mean anomaly: 175.6498 deg
Mean motion: 14.27975951 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 286
Checksum: 317

/EX

347. ORBS$323.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 13:49:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-323.n.1993@ampr.org>
Source record: 28607
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-323.N
2Line Orbital Elements 323.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX November 19, 1993
BID: $ORBS-323.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93321.57691393 -.00000112 00000-0 10000-3 0 2118
2 14129 27.1956 355.7539 6019652 131.0023 299.1524 2.05880635 78414
UO-11
1 14781U 84021B 93320.59791365 .00000224 00000-0 41964-4 0 6126
2 14781 97.7971 340.1743 0010901 227.3657 132.6634 14.69084435519091
RS-10/11
1 18129U 87054A 93320.53837545 .00000061 00000-0 60485-4 0 8120
2 18129 82.9209 126.0240 0010352 256.4589 103.5413 13.72326438320740
AO-13
1 19216U 88051B 93315.34314830 -.00000053 00000-0 10000-4 0 8137
2 19216 57.8997 284.7483 7226538 327.9276 3.4613 2.09719999 41435
FO-20
1 20480U 90013C 93310.07362541 -.00000005 00000-0 14874-4 0 6071
2 20480 99.0217 139.2984 0541030 125.0547 240.2545 12.83221816175512
AO-21
1 21087U 91006A 93320.47796564 .00000084 00000-0 82657-4 0 3683
2 21087 82.9418 300.1208 0034449 319.1873 40.6687 13.74528168140362
RS-12/13
1 21089U 91007A 93317.61990766 .00000004 00000-0 -23873-5 0 6129
2 21089 82.9233 171.3110 0029494 351.2997 8.7626 13.74029180139048
ARSENE
1 22654U 93031B 93319.82294071 -.00000052 00000-0 10000-3 0 2099
2 22654 1.4256 113.1022 2930832 161.7997 211.8626 1.42202608 2728
UO-14
1 20437U 90005B 93320.70053268 .00000071 00000-0 35429-4 0 9128
2 20437 98.6062 43.2321 0011712 93.9046 266.3482 14.29803677199228
AO-16
1 20439U 90005D 93320.27451247 .00000064 00000-0 32755-4 0 7120
```

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2 20439 98.6124 43.8287 0012274 95.5349 264.7257 14.29860785199173
DO-17
1 20440U 90005E 93320.66928486 .00000060 00000-0 31121-4 0 7121
2 20440 98.6144 44.4763 0012250 94.2945 265.9628 14.29997894199240
WO-18
1 20441U 90005F 93320.22118847 .00000057 00000-0 29710-4 0 7134
2 20441 98.6142 44.0490 0012764 95.8251 264.4402 14.29975696199182
LO-19
1 20442U 90005G 93320.70317511 .00000061 00000-0 31205-4 0 7123
2 20442 98.6151 44.7345 0013139 93.7468 266.5215 14.30068015199267
UO-22
1 21575U 91050B 93320.68042724 .00000105 00000-0 42463-4 0 4124
2 21575 98.4578 34.2356 0006986 200.1876 159.9027 14.36865218122562
KO-23
1 22077U 92052B 93320.59051504 .00000000 00000-0 10000-3 0 3091
2 22077 66.0900 5.1031 0005093 341.0856 18.9960 12.86281800 59446
AO-27
1 22825U 93061C 93320.66241511 .00000070 00000-0 36625-4 0 2111
2 22825 98.6771 33.3777 0009303 106.2143 254.0076 14.27590086 7363
IO-26
1 22826U 93061D 93320.65872634 .00000073 00000-0 37587-4 0 2129
2 22826 98.6768 33.3808 0009869 107.8468 252.3794 14.27692506 7367
KO-25
1 22830U 93061H 93319.73628661 .00000064 00000-0 33726-4 0 2121
2 22830 98.5788 31.9792 0012486 82.0123 278.2466 14.28016160 7236
NOAA-9
1 15427U 84123A 93321.67817478 .00000105 00000-0 66146-4 0 6128
2 15427 99.0821 4.3682 0015882 95.7490 264.5523 14.13562457460466
NOAA-10
1 16969U 86073A 93315.75032400 .00000081 00000-0 42765-4 0 5091
2 16969 98.5140 326.3695 0012248 244.0314 115.9574 14.24842726371642
MET-2/17
1 18820U 88005A 93319.86072672 .00000065 00000-0 52347-4 0 2116
2 18820 82.5421 78.2816 0017893 61.8037 298.4910 13.84697554292837
MET-3/2
1 19336U 88064A 93319.83299665 .00000043 00000-0 10000-3 0 2119
2 19336 82.5384 114.6617 0017926 77.8342 282.4811 13.16962335255171
NOAA-11
1 19531U 88089A 93315.67695101 .00000165 00000-0 99084-4 0 4090
2 19531 99.1508 294.5292 0012515 27.3413 332.8509 14.12931327264500
MET-2/18
1 19851U 89018A 93320.51300057 .00000045 00000-0 35160-4 0 2124
2 19851 82.5191 313.4772 0015680 100.7230 259.5690 13.84349177238266
MET-3/3
1 20305U 89086A 93320.32104910 .00000043 00000-0 10000-3 0 9135
2 20305 82.5525 57.5423 0017403 95.7518 264.5640 13.16021908195110
MET-2/19
1 20670U 90057A 93320.64092393 .00000015 00000-0 79036-5 0 7128
2 20670 82.5491 17.2997 0016711 28.5586 331.6512 13.84181803171211
FY-1/2
```

```
1 20788U 90081A 93314.27490495 .00000352 00000-0 25587-3 0 8161
2 20788 98.8528 336.2622 0014224 264.8255 95.1288 14.01329924163048
MET-2/20
1 20826U 90086A 93320.47980517 .00000052 00000-0 42267-4 0 7113
2 20826 82.5249 315.2181 0011921 288.0238 71.9627 13.83563968158341
MET-3/4
1 21232U 91030A 93320.51833216 .00000043 00000-0 10000-3 0 6155
2 21232 82.5409 319.9466 0013471 2.5209 357.5653 13.16456371123379
NOAA-12
1 21263U 91032A 93315.68793624 .00000176 00000-0 87457-4 0 8162
2 21263 98.6427 343.0215 0013434 143.1680 217.0407 14.22331177129619
MET-3/5
1 21655U 91056A 93320.38880675 .00000043 00000-0 10000-3 0 6125
2 21655 82.5551 267.0163 0014334 12.2322 347.9178 13.16825934108458
MET-2/21
1 22782U 93055A 93320.66678128 .00000033 00000-0 25012-4 0 2111
2 22782 82.5521 14.8526 0023798 100.3379 260.0455 13.82991168 10713
MIR
1 16609U 86017A 93321.57070583 .00007939 00000-0 10816-3 0 5866
2 16609 51.6139 168.8603 0005214 358.7317 0.6246 15.58545846443041
HUBBLE
1 20580U 90037B 93320.38852573 .00000748 00000-0 63165-4 0 3620
2 20580 28.4687 163.2233 0004748 200.0009 160.0464 14.92922012194272
GRO
1 21225U 91027B 93321.24933334 .00018416 00000-0 19624-3 0 2224
2 21225 28.4618 264.6526 0074975 90.1642 270.7885 15.58731637 24209
UARS
1 21701U 91063B 93315.59270845 -.00001996 00000-0 -16511-3 0 4125
2 21701 56.9842 310.8939 0005642 92.8950 267.4094 14.96195848118366
POSAT
1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
/EX
```

348. * SpaceNews 22-Nov-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 15:10:15 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1122.1993@ampr.org>
Source record: 28608
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1122
* SpaceNews 22-Nov-93 *

BID: $SPC1122

=========
SpaceNews
=========

MONDAY NOVEMBER 22, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* FO-20 NEWS *
==============
Latest Status:
Nov.12 On 20z pass and 22z pass, software reloading performed.
22:36z MailBox operation resumed.

Operation Schedule:
Analog mode: Nov.17 7:44 -to- Nov.18 8:15 UTC
Nov.24 8:20 -to- Nov.25 8:38 UTC
Dec. 1 8:43 -to- Dec. 7 7:16 UTC
Dec.15 7:41 -to- Dec.22 8:05 UTC

Digital mode: otherwise noted above.

In December, analog mode and digital mode will be ON alternately for a week respectivery. Enjoy!

[Info via Kazu Sakamoto, JJ1WTK]

* AO-13 NEWS *
==============
AO-13 will experience another partial solar eclipse on 1993 Dec 13 [Mon].

It sees the Moon eclipse the Sun from 1009 - 1059 utc with a maximum 53% obscuration at 1034 utc. This is orbit 4211 MA 73-92.

The encounter will be "visible" on the telemetry to stations throughout the USA and Japan. Reports would be appreciated. Stations who observed the spectacular eclipse of Nov 13 will know what to look for.

Eclipses of Sun by Earth:

These commence on Dec 07 [Tue] and continue until Dec 24 [Fri]. The eclipses are of course total. The maximum lasts 2 hours 16 minutes, and is

the longest AO-13 has ever experienced. The telemetry during these outages is very interesting, particularly the temperatures; some reach -40 C.

The mode-B transponder will be OFF from MA 95 to 180 during this two week period.

[Info via James Miler, G3RUH]

* SPACE SHUTTLE STATUS *
==========
MISSION: STS-61: HUBBLE SPACE TELESCOPE SERVICING

VEHICLE: Endeavour/OV-105 ORBITAL ALTITUDE: 356 miles
LOCATION: Pad 39-B INCLINATION: 28 degrees
TARGET LAUNCH DATE: December 1 CREW SIZE: 7
LAUNCH TIME: 4:57 a.m. EST LAUNCH WINDOW: 1 hour/7 min.
LANDING LOCATION: KSC
MISSION DURATION: 10 days/22 hours
EXPECTED KSC LANDING DATE/TIME: Dec. 12/2:42 a.m. EST

MISSION: STS-60: WAKE SHIELD FACILITY AND SPACEHAB 2

VEHICLE: Discovery/OV-103 ORBITAL ALTITUDE: 218 miles
LOCATION: OPF bay 3 INCLINATION: 57.00 degrees
TARGET LAUNCH PERIOD: mid January CREW SIZE: 6
LAUNCH WINDOW: 3 hour/48 minutes LANDING LOCATION: KSC
MISSION DURATION: 8 days/5 hours

MISSION: STS-62: U.S. MICROGRAVITY PAYLOAD - 2

VEHICLE: Columbia/OV-102 ORBITAL ALTITUDE: 184 miles
LOCATION: OPF bay 2 INCLINATION: 39.00 degrees
TARGET LAUNCH PERIOD: Early March CREW SIZE: 5
LAUNCH WINDOW: 3 hours/57 minutes LANDING LOCATION: KSC
MISSION DURATION: 14 days

[Info via NASA]

* STS-61 NEWS *
==========
NASA managers set Dec. 1, 1993, as the offical launch date for Shuttle Mission STS-61. The flight will see Space Shuttle Endeavour with a 7 person crew make the first in a series of planned visits to the orbiting Hubble Space Telescope (HST). During the mission, a record five spacewalks will be conducted during which the astronauts will remove and replace various HST systems in order to increase HST's reliability; compensate for the spherical aberration of the primary mirror; and validate the HST on-orbit servicing concept.

The launch window on Dec. 1 opens at 4:57 a.m. EST and extends for 1 hour 7 minutes. The launch window is driven by rendezvous requirements with HST. The mission duration is planned for 10 days, 22 hours and 36 minutes. Landing is scheduled to take place at Kennedy Space Center's Shuttle Landing Facility, Fla., on Dec. 12.

Leading the STS-61 crew will be Mission Commander Dick Covey. Pilot for the mission is Ken Bowersox. The mission specialists for the flight are Kathy Thornton, Claude Nicollier, Jeff Hoffman, Story Musgrave and Tom Akers. Working in pairs, Hoffman and Musgrave and Thornton and Akers, all of whom have previous EVA experience, will perform the five spacewalks scheduled for flight days four to eight.

[Info via NASA]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

Steve J. Sibert, NF2G, ZS5FR

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

349. STS-Plus or Code available

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 17:21:38 UTC
From: kss@sslxt1.nswses.navy.mil
Message-ID: <39941@suned1.Nswses.Navy.MIL>
Source record: 28609

How do you like the STS-Plus program? Is there some source code on the internet
that I could use on my SUN workstation? I am a supporter of AMSAT but money
is a little tight this year.
---

kss@suned1.NSWSES.Navy.MIL kss@suned1.uucp
Any statements / opinions made here are mine, alone, not the Navy's.
HAVE A GOOD ONE!

350. SAT Code on the NET

Newsgroup: rec.radio.amateur.space
Date: 1993-11-19 17:24:38 UTC
From: kss@sslxt1.nswses.navy.mil
Message-ID: <39942@suned1.Nswses.Navy.MIL>
Source record: 28610

Everyone is offering elements but I can't do anything without
some software. I am a supporter of AMSAT but money is a little
tight this year. Is there some SAT source code available that I can
use to run on my SUN workstation?
---

kss@suned1.NSWSES.Navy.MIL kss@suned1.uucp
Any statements / opinions made here are mine, alone, not the Navy's.
HAVE A GOOD ONE!

351. Two-Line Orbital Element Sets (TLE296)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-20 03:46:21 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.753767181@afit.af.mil>
Source record: 28411
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #296 -
Alouette 1
1 00424U 62049 93320.55842535 .00000081 00000-0 91670-4 0 9137
2 00424 80.4636 134.7896 0022798 303.3692 56.5267 13.67787836553337
ATS 3
1 03029U 67111A 93321.53482604 -.00000081 00000-0 10000-3 0 1109
2 03029 14.5003 9.6434 0020712 241.4098 252.8976 1.00278883 95319
Cosmos 398
1 04966U 71016A 93322.19128735 .00104022 32795-4 26436-3 0 7907
2 04966 51.4556 49.2876 1232254 120.6813 252.0896 13.39781565743946
Starlette
1 07646U 75010A 93320.80253618 -.00000043 00000-0 14250-4 0 7112
2 07646 49.8256 271.4566 0205938 354.8167 5.0550 13.82184522948463
LAGEOS
1 08820U 76039A 93319.67160067 -.00000001 00000-0 10000-3 0 9133
2 08820 109.8576 62.4496 0044165 330.6895 29.1268 6.38664549153515
ETS-2
1 09852U 77014A 93315.64518670 .00000115 00000-0 10000-3 0 9082
2 09852 11.7646 44.1098 0000417 69.1689 7.9235 1.00014189 8488
GOES 2
1 10061U 77048A 93320.33164692 .00000109 00000-0 10000-3 0 2183
2 10061 10.8018 48.3061 0002468 31.1296 319.4095 1.00266765 4976
IUE
1 10637U 78012A 93321.25916968 -.00000184 00000-0 00000+0 0 9149
2 10637 34.3297 98.3747 1324110 32.9289 329.2930 1.00271230 10599
GPS BI-01
1 10684U 78020A 93311.09083195 -.00000013 00000-0 10000-3 0 2068
2 10684 64.5250 52.1204 0063965 162.2632 197.9641 1.98069643100530
GPS BI-02
1 10893U 78047A 93322.46872453 -.00000016 00000-0 10000-3 0 2079
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2 10953 9.7428 51.1873 0005006 90.5037 323.8965 1.00298886 9591
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2 10967 108.0048 20.8036 0002888 261.4771 98.6050 14.37889909805693
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2 11141 64.5087 52.8979 0048126 24.8140 335.4185 1.92894849108765
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UoSat 2
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Kvant-1
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DMSP B5D2-3
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2 18123 98.7899 150.3003 0015187 67.4569 292.8217 14.15317384330923
RS-10/11
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Meteor 2-17
1 18820U 88005A 93319.86072672 .00000065 00000-0 52347-4 0 2116
2 18820 82.5421 78.2816 0017893 61.8037 298.4910 13.84697554292837
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1 18822U 88006A 93320.56305309 .00000141 00000-0 71018-4 0 2205
2 18822 98.4655 179.0107 0005493 245.6435 114.4180 14.22897891300288
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2 19163 64.9933 117.6412 0007623 164.9696 195.0296 2.13101526 42084
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METEOSAT 3
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2 19215 1.2635 73.9067 0003761 221.6353 142.0397 1.00267526 7774
AO-13
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2 19216 57.8961 283.8628 7213921 328.4529 3.5238 2.09719617 10039
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Glonass 39
1 19503U 88085C 93319.04877594 -.00000016 00000-0 10000-3 0 1080
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2 19749 64.9320 117.1482 0004999 259.5931 100.3305 2.13100963 37765
Glonass 41
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2 19750 64.9586 117.1958 0006593 247.8070 112.1145 2.13101960 37777
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1 19802U 89013A 93320.33696080 .00000031 00000-0 10000-3 0 8125
2 19802 55.0744 148.1516 0035721 173.3701 186.7220 2.00567434 34771
Akebono
1 19822U 89016A 93321.65702312 .00009994 00000-0 59441-3 0 1269
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GPS BII-03
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Meteor 3-3
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2 20305 82.5525 57.5423 0017403 95.7518 264.5640 13.16021908195110
COBE
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Kvant-2
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SPOT 2
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2 21225 28.4618 264.6526 0074975 90.1642 270.7885 15.58731637 24209
Meteor 3-4
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Meteor 3-5
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UARS
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DMSP B5D2-6
1 21798U 91082A 93320.20784508 .00000185 00000-0 11789-3 0 9733
2 21798 98.9584 320.5948 0013420 25.0753 335.1039 14.13732276101524
Glonass 53
1 21853U 92005A 93320.08228219 .00000021 00000-0 10000-3 0 8114
2 21853 64.8542 116.2794 0006699 192.3215 167.6422 2.13102250 14002
Glonass 54
1 21854U 92005B 93321.31364104 .00000020 00000-0 00000+0 0 8345
2 21854 64.8621 116.2282 0016088 20.7866 339.2709 2.13102712 14011
Glonass 55
1 21855U 92005C 93320.43538524 .00000020 00000-0 00000+0 0 8279
2 21855 64.8628 116.2661 0007242 192.1206 167.8490 2.13101732 13982
JERS-1
1 21867U 92007A 93321.23243469 .00003187 00000-0 27013-3 0 1293
2 21867 97.6662 34.9885 0002402 88.0045 272.1703 14.98671529 96630
GPS BIIA-12
1 21890U 92009A 93320.37415669 -.00000018 00000-0 10000-3 0 4133
2 21890 54.2595 265.5224 0056740 159.8214 200.3960 2.00560320 12708
GPS BIIA-13
1 21930U 92019A 93320.08641325 -.00000028 00000-0 10000-3 0 4149
2 21930 55.5086 26.3726 0059762 167.1712 193.0352 2.00563004 11630
EUVE
1 21987U 92031A 93320.62678313 .00001762 00000-0 79913-4 0 2133
2 21987 28.4338 39.4364 0010558 172.5568 187.5211 15.17791751 80051
SAMPEX
1 22012U 92038A 93320.69668718 .00001331 00000-0 11278-3 0 4161
2 22012 81.6733 34.5622 0119121 12.0141 348.3849 14.91827261 74644
GPS BIIA-14
1 22014U 92039A 93319.62373482 .00000016 00000-0 10000-3 0 3133
2 22014 54.9169 206.2543 0082962 293.9477 65.2709 2.00572294 3457
Glonass 56
1 22056U 92047A 93321.27484825 -.00000017 00000-0 00000+0 0 7306
2 22056 64.9266 356.2496 0007988 261.6660 98.3097 2.13102849 10090
Glonass 57
1 22057U 92047B 93322.03778738 -.00000018 00000-0 00000+0 0 7346
2 22057 64.9404 356.2407 0009801 303.1172 56.8289 2.13102460 10094
Glonass 58
1 22058U 92047C 93321.04040559 -.00000017 00000-0 00000+0 0 7338
2 22058 64.9356 356.2837 0011630 274.9669 84.9478 2.13102479 10112
TOPEX
1 22076U 92052A 93320.51680781 -.00000001 00000-0 10000-3 0 6687
2 22076 66.0452 12.7421 0007949 263.5810 96.4283 12.80930508 59252
KITSAT-A
1 22077U 92052B 93320.59051504 .00000000 00000-0 10000-3 0 3091
2 22077 66.0900 5.1031 0005093 341.0856 18.9960 12.86281800 59446
S80/T
1 22078U 92052C 93320.56729409 .00000000 00000-0 10000-3 0 3095
2 22078 66.0902 4.6616 0006262 350.6867 9.4023 12.86563356 59500
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TOPEX R/B
1 22079U 92052D 93320.65318160 -.00000002 00000-0 10000-3 0 3097
2 22079 66.0743 19.3391 0075426 291.9279 67.3722 12.77663266 59194
GPS BIIA-15
1 22108U 92058A 93320.08571804 -.00000019 00000-0 10000-3 0 3132
2 22108 54.4748 266.1900 0103859 132.6757 228.1965 2.00568558 8648
FREJA
1 22161U 92064A 93313.89043228 -.00000012 00000-0 17171-4 0 3111
2 22161 63.0075 127.3695 0773858 295.7490 56.5628 13.21682165 52815
LAGEOS II
1 22195U 92070B 93320.44390066 -.00000004 00000-0 10000-3 0 2123
2 22195 52.6507 228.1481 0137863 24.6402 336.0673 6.47293813 25163
GPS BIIA-16
1 22231U 92079A 93317.77886864 .00000013 00000-0 10000-3 0 3165
2 22231 54.7701 207.6145 0038571 295.7340 63.9374 2.00567077 7176
GPS BIIA-17
1 22275U 92089A 93320.41134156 .00000017 00000-0 10000-3 0 3152
2 22275 54.6732 205.0494 0048500 257.8717 101.6269 2.00560569 6638
TDRS 5
1 22314U 93003B 93319.13244235 -.00000245 00000-0 10000-3 0 3143
2 22314 0.6294 71.7865 0003180 205.9302 129.4378 1.00547108 3184
GPS BIIA-18
1 22446U 93007A 93321.48525568 -.00000027 00000-0 10000-3 0 3132
2 22446 54.7597 325.9912 0068229 335.8421 23.8472 2.00552996 5684
Glonass 59
1 22512U 93010A 93320.08279863 .00000020 00000-0 00000+0 0 4317
2 22512 64.8758 116.1252 0009207 186.9298 173.0448 2.13101850 5587
Glonass 60
1 22513U 93010B 93320.02354594 .00000020 00000-0 00000+0 0 4384
2 22513 64.8622 116.1414 0007338 183.0480 176.9341 2.13102579 5787
Glonass 61
1 22514U 93010C 93320.25880031 .00000020 00000-0 00000+0 0 4289
2 22514 64.8827 116.1173 0014172 184.9832 174.9910 2.13101700 5765
ASTRO-D
1 22521U 93011A 93320.41925893 .00000969 00000-0 82812-4 0 2121
2 22521 31.1042 331.8522 0076897 174.4984 185.6609 14.92702160 40262
UHF F1
1 22563U 93015A 93319.00000000 -.00000205 00000-0 10000-3 0 2064
2 22563 27.0264 302.8922 0009087 288.7854 157.8082 0.99255355 6711
GPS BIIA-19
1 22581U 93017A 93321.13257795 -.00000028 00000-0 10000-3 0 2140
2 22581 55.0070 26.1780 0041056 33.4155 326.8475 2.00576085 4707
ProgressM17
1 22588U 93019A 93321.11235667 .00019582 00000-0 17476-3 0 3498
2 22588 51.6201 165.7764 0002643 357.2886 2.8131 15.68427729 36029
ARSENE
1 22654U 93031B 93319.82294071 -.00000052 00000-0 10000-3 0 2099
2 22654 1.4256 113.1022 2930832 161.7997 211.8626 1.42202608 2728
GPS BIIA-20
1 22657U 93 32 A 93293.34104706 -.00000026 00000-0 99999-4 0 2058
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2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21
1 22700U 93042A 93318.73817820 -.00000020 00000-0 10000-3 0 2124
2 22700 54.6564 266.9398 0025928 304.7276 55.0121 2.00571450 2786
Soyuz TM-17
1 22704U 93043A 93319.90475325 .00005952 00000-0 76342-4 0 2286
2 22704 51.6161 177.2381 0005856 42.7447 317.4380 15.59601982442796
NOAA 13
1 22739U 93050A 93320.67847165 -.00000001 00000-0 10000-4 0 2070
2 22739 98.9224 261.1815 0010300 5.3515 354.7803 14.10861848 13988
GPS BIIA-22
1 22779U 93054A 93319.32209690 -.00000027 00000-0 10000-3 0 2182
2 22779 54.8915 325.9482 0027031 227.8958 131.8914 2.00555626 1546
Meteor 2-21
1 22782U 93055A 93320.66678128 .00000033 00000-0 25012-4 0 2111
2 22782 82.5521 14.8526 0023798 100.3379 260.0455 13.82991168 10713
SPOT 3
1 22823U 93061A 93321.06463742 .00000194 00000-0 10000-3 0 2188
2 22823 98.7402 33.5229 0001084 92.9887 267.1511 14.20025724 7376
STELLA
1 22824U 93061B 93320.68020038 -.00000024 00000-0 -19169-5 0 2117
2 22824 98.6803 33.3817 0007068 104.3831 255.8156 14.27092954 7361
KO-25
1 22825U 93061C 93320.66241511 .00000070 00000-0 36625-4 0 2111
2 22825 98.6771 33.3777 0009303 106.2143 254.0076 14.27590086 7363
POSAT-1
1 22826U 93061D 93320.65872634 .00000073 00000-0 37587-4 0 2129
2 22826 98.6768 33.3808 0009869 107.8468 252.3794 14.27692506 7367
HEATHSAT
1 22827U 93061E 93320.65509035 .00000063 00000-0 33521-4 0 2743
2 22827 98.6742 33.3684 0010167 96.7848 263.4502 14.27792322 7360
ITAMSAT
1 22828U 93061F 93320.58501009 .00000190 00000-0 84830-4 0 2109
2 22828 98.6735 33.2975 0010309 97.3934 262.8373 14.27793684 7356
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93319.73628661 .00000064 00000-0 33726-4 0 2121
2 22830 98.5788 31.9792 0012486 82.0123 278.2466 14.28016160 7236
ProgressM20
1 22867U 93064A 93320.86588524 .00001897 00000-0 26517-4 0 227
2 22867 51.6168 172.4051 0005619 43.7354 316.4356 15.59615577442954
1993 066A
1 22871U 93066A 93318.51894869 .01199862 10540-4 00000+0 0 167
2 22871 0.0221 192.4766 0028689 117.3464 51.3379 1.00267079 270
1993 067A
1 22875U 93067A 93321.71681427 .00012987 00000-0 27766-3 0 194
2 22875 82.9395 240.8902 0874875 48.2933 318.9553 13.89392190 1229
1993 067B
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1 22876U 93067B 93321.83818048 .00029160 00000-0 57986-3 0 838
2 22876 82.9445 240.7547 0873500 47.2423 319.8740 13.91084445 3119
GPS BIIA-23
1 22877U 93068A 93319.37352171 -.00000005 00000-0 10000-3 0 133
2 22877 55.0675 87.0281 0029305 280.7822 78.5521 2.00560309 430
1993 068B
1 22878U 93068B 93320.37983901 .00006352 00000-0 23916-3 0 115
2 22878 35.1484 294.5484 0058756 349.0906 10.8630 15.24818188 3144
Gorizont 28
1 22880U 93069A 93318.37240812 -.00000204 00000-0 10000-3 0 204
2 22880 1.4294 277.2058 0004394 307.2499 53.0240 1.00281451 182
1993 069D
1 22883U 93069D 93302.41277744 -.00000264 00000-0 10000-3 0 14
2 22883 1.5627 278.5623 0011829 335.2585 23.3984 1.00483378 26
1993 069E
1 22884U 93069E 93321.00688147 .00003475 00000-0 93661-3 0 92
2 22884 47.3515 270.0502 7284332 4.9905 359.3417 2.27839728 452
1993 069F
1 22885U 93069F 93317.96426893 .00001016 00000-0 81452-3 0 62
2 22885 47.3964 270.9681 7263959 4.1211 359.3643 2.27359365 390
Unknown
1 22887U 93321.95984949 .02493777 00000-0 68174-2 0 215
2 22887 51.5925 165.4115 0007712 248.2412 111.0721 15.87958100443108
Cosmos 2266
1 22888U 93070A 93315.88573060 .00000051 00000-0 47352-4 0 122
2 22888 82.9521 245.5280 0047176 268.9785 90.5983 13.74205651 1293
1993 070B
1 22889U 93070B 93321.83436633 .00024298 00000-0 24576-1 0 173
2 22889 82.9483 241.0961 0039526 241.1225 118.8629 13.76541546 2122
Cosmos 2267
1 22904U 93071A 93322.44793388 .00140498 11742-4 19150-3 0 290
2 22904 70.3837 176.1050 0042331 51.0381 309.3350 16.04263873 2092
1993 071B
1 22905U 93071B 93311.92447531 .09064086 20195-4 29855-3 0 133
2 22905 70.3948 206.3729 0012203 14.1338 346.8177 16.43572852 412
1993 066B
1 22906U 93066B 93321.43740417 .00069372 94547-5 44977-3 0 111
2 22906 6.9559 295.3807 7349991 199.7306 103.0263 2.24924306 193
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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352. Packet+OSCAR

Newsgroup: rec.radio.amateur.space
Date: 1993-11-21 21:06:32 UTC
From: rob@theporch.raider.net
Message-ID: <L6uDDc1w165w@theporch.raider.net>
Source record: 28412

Hello,
I have just started in Ham Radio and I have a question about Packet
and OSCAR satelites. Would it be possible to uploaded mail from a PBBS
on to one of the OSCAR satelite and save it so that it could be downloaded
later? I ask this because I have a computer network called HamNet which is
dedicated to Ham Radio. I would like to be able to upload mail to and
OSCAR so that my network could become International without the phone
bills. Thank you,
Rob Walker

For information on HamNet contact:
Rob Walker-(615)383-1969
The Comedy Shack-(615)383-9829
FidoNet-1:116/106
OurNet-65:410/106

--
rob@theporch.raider.net (Rob Walker)
theporch.raider.net 615/297-7951 The MacInteresteds of Nashville

353. ANS-324 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-11-22 00:44:12 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-324.01.1993@ampr.org>
Source record: 28413
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-324.01
MORE DOVE TELEMETRY FORMATS

HR AMSAT NEWS SERVICE BULLETIN 324.01 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 20, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-324.01

NK6K Explains More Of DOVE's Telemetry Format

The LSTAT line is sent by the loader portion of PHT (the loader/command/
telemetry task). It purpose is to show the state of the software loader
process so that if something goes wrong during upload, the DOVE ground
command stations can tell what needs to be done to continue the process.

The LSTAT line comes in two types, as shown below.

I P:0xhhhh o:n l:nnnn f:nnnn, d:n st:n\

A: 0xhhhh, P:0xhhhh, o:n l:nnnn f:nnnn, d:n st:n

I - means there is no software load in progress (inactive)

A: - means a software load is in progress (active). hhhh is the segment
address of the program being loaded.

P: - the segment of the running program (PHT). The initial load of PHT
is always at 0x3000. Any other address here means PHT has been
reloaded.

o: - The number of times the HDLC output queue was full when PHT tried to
send a frame. This is left over from debugging the only major bug
found in the I/O drivers since launch. A bug occasionally caused
a 65,535 byte frame to be sent, filling the output queue for nine
minutes. This should always be zero.

l: - The largest free memory block, in decimal paragraphs. To find the
the number of free bytes in the largest block, multiply this number
by 16. This number shows the largest program that can be loaded at
that time.

f: - The total amount of free memory, in decimal paragraphs.

d: - The digipeat flag, 1 is digipeat on, 0 is digipeat off. (Will always
be off for DOVE)

st:- The task number of the last task loaded.

[The AMSAT News Service (ANS) would like to thank Harold Price (NK6K) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-324.02
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 324.02 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 20, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-324.02

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

28-Nov-93 0230 B 39 WJ9F VE2LVC
12-Dec-93 0435 B 180 W9ODI WB6LLO
3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-324.03
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 324.03 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 20, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-324.03

Weekly OSCAR Status Reports: 20-NOV-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.

Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
AO-13 will experience another partial solar eclipse on 1993 Dec 13 [Mon]. It sees the Moon eclipse the Sun from 10:09 - 10:59 UTC with a maximum 53% obscuration at 1034 utc. This is Orbit #4211 MA 73-92. The encounter will be "visible" on the telemetry to stations throughout the USA and Japan. Reports would be appreciated. Stations who observed this spectacular eclipse of Nov 13 will know what to look for. Eclipses of sun by earth commence on Dec 07 [Tue] and continue until Dec 24 [Fri]. The eclipses are of course total. The maximum lasts 2 hours and 16 minutes, and is the longest AO-13 has ever experienced. The telemetry during these outages is very interesting, particularly the spacecraft temperatures; some reach -40 C. The Mode-B transponder will be OFF from MA 95 to 180 during this two week period. [G3RUH/DB2OS/VK5AGR]

DOVE: TLM has been copied moderately well on 145.825 MHz, with much stronger signal levels on the S-band beacon. Please send any telemetry that you capture to PY2BJO at his INTERNET address of py2bjo@amsat.org. [W7IUV]

AO-16: Operating normally. [WH6I]

UO-22: Operating normally. [WH6I]

LO-19: Operating normally. [WH6I]

KO-23: Up and running. Busy as usual. There are a number of images. [WH6I]

KO-25: File system is up but not open for uploads. It appears that the satellite has taken and EIS image, but it is not available. [WH6I]

IO-26: Up and running with a lot of activity. [WH6I]

FO-20: The FO-20 Mode JA period on the 17-18th of November provided strong downlink and beacon signals but only moderate activity during the passes that were visible. The following is the FO-20 operating schedule:
Analog mode: 24-Nov-93 08:20 -to- 25-Nov-93 8:38 UTC
01-Dec-93 08:43 -to- 07-Dec-93 7:16 UTC
15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC
Digital mode: otherwise noted above. In December, analog mode and digital mode will be ON alternately for a week, respectively. [W7IUV & JJ1WTK]

RS-10: RS-10 has had excellent downlink signals, but only moderate activity during the last week. This bird produces more fun per pass than any other amateur satellite in orbit. [W7IUV]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a

regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

354. APT-Satellites: Report NOV 21, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-22 08:16:23 UTC
From: peter.henne@gmd.de
Message-ID: <1993Nov22.081623.23070@gmd.de>
Source record: 28414
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, NOV 21, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 On
Meteor 3-3: APT 137.30 On

NOAA-9, 11 and 12 transmit ch.2 and ch.4 from daylight parts
of the orbit, ch.3 and ch.4 from night passes. NOAA-10 always
transmits ch.2 and ch.4, so ch.2 (vis) is black at night.
No changes for Meteor 2-21 (weak signal) and Meteor 3-3, both
transmit only vis from daylight.
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+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
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355. MIR Packet frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-22 15:05:02 UTC
From: af765@Freenet.carleton.ca
Message-ID: <CGwF8E.BFL@freenet.carleton.ca>
Source record: 28415

I am looking for the MIR uplink/downlink frequencies for the packet BBS.
I had them a while back but can't find them now! Thanks.
73 Ken VE3MVV @ VE3NAV.#EON.ON.CAN.NA
or asmusk@cmc.aes.doe.ca
--

356. SPACE TRIVIA LIST UPDATE - 23rd November, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-23 12:21:44 UTC
From: lukpla@scorch.apana.org.au
Message-ID: <1993Nov23.122144.26376@scorch.apana.org.au>
Source record: 28416
Cross-posted to: sci.space,sci.space.shuttle,sci.astro,rec.radio.amateur.space

IF YOU POSSIBLY CAN, PLEASE CONTRIBUTE TO THIS LIST. THIS LIST DEPENDS
UPON THE KIND DONATIONS OF ITEMS FROM PEOPLE ON THE NET.

Ever onward we surge - The Guiness Book of Records is
revealing quite a number of items, and it has pushed our total number
over the magic 300. We have over 45 pages of trivia and it is most
definitely NOT stopping here.

I'd appreciate it if there is anyone at all who may be able to
respond to the items in the 'pure guesswork' section of this list.
This section is devoted to 'unsourced' items of trivia that have been
suggested or read from various different sources.

This list is now available via anonymous ftp from the following sites:

krakatoa.jsc.nasa.gov as /misc-docs/trivia.txt
ames.arc.nasa.gov as /pub/SPACE/MISC/trivia.txt

If at ANY time you want the latest update on the trivia list, then it
will be at one of these sites. I will be updating the complete list to
these sites each time an update appears in the newsgroups.

The news distribution of this file is now:-

sci.space
sci.space.shuttle
sci.astro

rec.radio.amateur.space

The last group will only be included when there are new items
of trivia are related to amateur radio in some way.

Luke Plaizier - Space Trivia List Moderator

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**************************************************************************
**************************************************************************
* *
* SPACE TRIVIA - Interesting Trivia Information on Manned and *
* Unmanned Spaceflight from anywhere around the *
* Globe. (Or the Universe for that matter!) *
* *
**************************************************************************
**************************************************************************
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(269) The remotest object visible with the naked eye is the great galaxy
in Andromeda known as Messier 31.

[Guiness Book of Records, 1992 Softcover edition.]

(270) The first double quasar (0957+56) among 1500 known quasars was announced in May 1980.
[Guiness Book of Records, 1992 Softcover edition.]

(271) The Nearest star to Earth, excepting the Sun, is the very faint Proxima Centauri, discovered in 1915, which is about 4.225 light years away.
[Guiness Book of Records, 1992 Softcover edition.]

(272) The nearest star visible to the naked eye is the binary Alpha Centauri or Rigel Kentaurus at 4.35 light years distant.
[Guiness Book of Records, 1992 Softcover edition.]

(273) The Alpha Centauri binary will reach a minimum distance from Earth of 2.84 light years in the year 29700 AD.
[Guiness Book of Records, 1992 Softcover edition.]

(274) The present distance of the Solar System from the centre of the Milky Way galaxy is 27 700 light years and it will reach a minimum distance of 27 600 light years (perigalacticon) in about 15 million years' time.
[Guiness Book of Records, 1992 Softcover edition.]

(275) The AVERAGE velocity of the Sun and nearby stars has been calculated to be 792 000km/h. However, the Sun's actual velocity is 97 200km/h faster than this average.
[Guiness Book of Records, 1992 Softcover edition.]

(276) The largest known star is Betelgeux at 310 light years distance, and is 500 times larger than the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(277) The heaviest known star is Eta Carinae, 9100 light-years distant in the Carinae Nebula in our own Galaxy. It has a mass some 200 times our own Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(278) The smallest known star appears to be the White Dwarf L362-81 with an estimated diameter of only 5600 km.
[Guiness Book of Records, 1992 Softcover edition.]

(279) The lightest and dimmest known star is RG 0058.8-2807, with a mass of only 0.014 that of our Sun, and a total luminosity of only 0.0021 that of the Sun.
[Guiness Book of Records, 1992 Softcover edition.]

(280) The brightest Supernova ever seen by historic Man is believed to be SN 1006, noted in April 1006 near Beta Lupi. It f;ared for two years and attained a magnitude of -9 to -10!
[Guiness Book of Records, 1992 Softcover edition.]

(281) The largest constellation is Hydra which covers 6.3% of the
hemisphere and contains 68 naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(282) The constellation Centaur, ranking 9th in area, has at least 94
naked eye stars.
[Guiness Book of Records, 1992 Softcover edition.]

(283) The smallest constellation is Crux Australis with an area of only
0.16% of the whole sky.
[Guiness Book of Records, 1992 Softcover edition.]

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* *
* SPACE RUMOURS - Interesting Rumours - True or Popular - that have *
* surfaced from anywhere around the globe concerning *
* space topics. *
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* *
* PURE GUESSWORK - Items that are awaiting verification for *
* placement into either rumour or fact trivia. *
* *
* *
****
****

(1) It seems that after STS-1 got in orbit, one of the astronauts was eager
to try out the (older, also expensive) toilet. I think it was Crippen.
Apparently all John Young heard was this "Whoosh AHHHHHH!!!!!".
There is a fan in it to suck down the contents. Apparently the
fan was verified to be working correctly (i.e. it spun up) but nobody
ever checked to see if it sucked or blew...
[From HOLLIS@TITAN.KSC.NASA.GOV]

(2) When trying to find a way to keep the water out of the parachute
compartment after splashdown, scientists ended up using a product
from a drug store. I saw this on a space travel special. The story
goes something like one of the project scientists sons was up with a
cold. So, the scientist mixed up a cold remedy gel (added water to a
powder) for his son late one night. This gave him the idea. When
itemizing the inventory for the project budget, they used the drug
store product code and used a backwards spelling of the product name.
Of course, they adapted it a bit for the spacecraft, but the same
principle of this gel was used.
[mark.blevis@qmail.dgrc.doc.ca]

(3) Supposedly, one shuttle launch was delayed due to a rare bird nesting
in the launch pad gantry. Does anyone know if this is true and if so
which launch ? (According to the guide on a KSC coach tour -
probably not the most reliable of sources 8-})
[Mark Grant <mark@isltd.insignia.com>]

(4) The Demise of Blue Streak and ELDO put paid to plans laid in 1968 to
launch leeches - 'the world's most ideal space travellers' - on an
extended flight.
"Give them a bloody meal before they go, and they'll need
nothing for a year-and-a-half!" was how one scientist characterized
the suitability of leeches for space travel. Posing no feeding or
waste disposal problems, leeches might even breed en-route -
providing researchers with a useful insight into the genetic side-
effects induced by exposure to radiation in space.

(5) In some respects, Neil Armstrong was fortunate to become the first
Moonwalker. In 1963, his place in the history books was under seige
from a chimpanzee named Howard!
After just one year of study at the US Space School, Howard
had broken the world's land speed record in a rocket propelled
sled, and had been banned from playing noughts-and-crosses with
visitors because he usually won!
The chances are that if a monkey had been selected to fly to
the Moon instead of a man, it would have been Howard.

(6) Under the direction of NASA's Ames Research Center in California, a
study was conducted into the viability of employing a 'vacuum cleaner'
type device in Low-Earth orbit to collect some of the particles of
Moonrock (tectites) that are dislodged from the lunar surface by
annual meteorite showers and sometimes find their way to the
Earth's surface.
Collected in orbit and returned to Earth by parachute, samples
gathered in this way would be free from the contamination caused by
passage through the Earth's atmosphere.

(7) In reference ot item 64 in the trivia list, Is the reason given true?
1978-1986 the rumor was that if ejected at 100 Kft then you would drift
up to 200 Kft before falling back. During the fall, the aero heating
would become so intense that helmet melting would be likely. I'd love
to know real reason the 100Kft limit was enacted.
[from rlove@raptor.rmnug.org]

(Can anyone come up with some sources for backing up/refuting the last
three items?)

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(255)

357. Re: MIR Packet frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-23 15:07:04 UTC
From: Larry_L_Ledlow@cup.portal.com
Message-ID: <96562@cup.portal.com>
Source record: 28417

Mir packet is on 145.55 MHz. 1200 baud AFSK. The call is R0MIR-1.
You'll occasionally hear thecosmonauts working FM voice on this freq.
This usualy happens Friday/Saturday nights when they have some spare time.

73s, Larry
na5e@genie.geis.com

358. Re: Satellites and Frequencys

Newsgroup: rec.radio.amateur.space
Date: 1993-11-24 16:56:59 UTC
From: laurahal@microsoft.com
Message-ID: <CH09r4.n46@microsoft.com>
Source record: 28424

Shameless plug: you can get all this information and lots more
from AMSAT. Including useful introductory materials, a way cool
journal, and lots more.

73,
laura VE7LDH

359. Control of Amateur Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-11-24 20:28:25 UTC
From: sdd@larc.nasa.gov
Message-ID: <2d0g59$429@reznor.larc.nasa.gov>
Source record: 28418

For those of you who design, build, and operate amateur radio satellites --

What do you use for attitude control and knowledge? Is attitude control even necessary for small satellites? Also, is thermal control strictly passive, or are there heaters on board your spacecraft? Thanks!

--
Steve Derry
<s.d.derry@larc.nasa.gov>

360. ORBS$328.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-25 03:18:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-328.o.1993@ampr.org>
Source record: 28419
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-328.O
Orbital Elements 328.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX November 24, 1993
BID: $ORBS-328.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93321.57691393
Element set: 211
Inclination: 27.1956 deg
RA of node: 355.7539 deg
Eccentricity: 0.6019652
Arg of perigee: 131.0023 deg
Mean anomaly: 299.1524 deg
Mean motion: 2.05880635 rev/day
Decay rate: -1.12e-06 rev/day^2
Epoch rev: 7841
Checksum: 293

Satellite: UO-11
Catalog number: 14781
Epoch time: 93325.57000090
Element set: 613
Inclination: 97.7960 deg
RA of node: 344.9183 deg
Eccentricity: 0.0010964
Arg of perigee: 210.4629 deg
Mean anomaly: 149.5959 deg
Mean motion: 14.69087530 rev/day
Decay rate: 2.69e-06 rev/day^2
Epoch rev: 51982
Checksum: 327

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93325.49625370
Element set: 813
Inclination: 82.9207 deg
RA of node: 122.3575 deg
Eccentricity: 0.0010357
Arg of perigee: 239.9809 deg
```

Mean anomaly: 120.0325 deg
Mean motion: 13.72326180 rev/day
Decay rate: 1.6e-07 rev/day^2
Epoch rev: 32142
Checksum: 279

Satellite: AO-13
Catalog number: 19216
Epoch time: 93324.87971886
Element set: 815
Inclination: 57.8676 deg
RA of node: 283.0185 deg
Eccentricity: 0.7211074
Arg of perigee: 328.8644 deg
Mean anomaly: 3.5221 deg
Mean motion: 2.09724867 rev/day
Decay rate: -2.21e-06 rev/day^2
Epoch rev: 4164
Checksum: 324

Satellite: FO-20
Catalog number: 20480
Epoch time: 93325.97912877
Element set: 610
Inclination: 99.0202 deg
RA of node: 152.1718 deg
Eccentricity: 0.0541163
Arg of perigee: 89.0188 deg
Mean anomaly: 277.2925 deg
Mean motion: 12.83222068 rev/day
Decay rate: -5.0e-08 rev/day^2
Epoch rev: 17755
Checksum: 307

Satellite: AO-21
Catalog number: 21087
Epoch time: 93327.46610100
Element set: 370
Inclination: 82.9432 deg
RA of node: 294.9482 deg
Eccentricity: 0.0034102
Arg of perigee: 299.3528 deg
Mean anomaly: 60.4149 deg
Mean motion: 13.74528481 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 14131
Checksum: 287

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93327.59616256

Element set: 614
Inclination: 82.9217 deg
RA of node: 163.9135 deg
Eccentricity: 0.0028927
Arg of perigee: 323.6427 deg
Mean anomaly: 36.2770 deg
Mean motion: 13.74030145 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 14041
Checksum: 291

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

361. ORBS$328.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-25 03:21:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-328.d.1993@ampr.org>
Source record: 28420
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-328.D
Orbital Elements 328.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX November 24, 1993
BID: $ORBS-328.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93324.75934626
Element set: 913
Inclination: 98.6041 deg
RA of node: 47.2419 deg
Eccentricity: 0.0011859
Arg of perigee: 83.0955 deg
Mean anomaly: 277.1590 deg
Mean motion: 14.29805061 rev/day
Decay rate: 1.24e-06 rev/day^2
Epoch rev: 19980
Checksum: 317

Satellite: AO-16
Catalog number: 20439
Epoch time: 93324.68304767
Element set: 713
Inclination: 98.6140 deg
RA of node: 48.1917 deg
Eccentricity: 0.0012184
Arg of perigee: 83.5887 deg
Mean anomaly: 276.6705 deg
Mean motion: 14.29861812 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 19980
Checksum: 336

Satellite: DO-17
Catalog number: 20440
Epoch time: 93325.21733703
Element set: 713
Inclination: 98.6142 deg
RA of node: 48.9764 deg
Eccentricity: 0.0012282
Arg of perigee: 81.4113 deg
```

Mean anomaly: 278.8478 deg
Mean motion: 14.29999401 rev/day
Decay rate: 1.09e-06 rev/day^2
Epoch rev: 19989
Checksum: 326

Satellite: WO-18
Catalog number: 20441
Epoch time: 93324.69934066
Element set: 714
Inclination: 98.6145 deg
RA of node: 48.4799 deg
Eccentricity: 0.0012824
Arg of perigee: 83.2364 deg
Mean anomaly: 277.0290 deg
Mean motion: 14.29976777 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 19982
Checksum: 348

Satellite: LO-19
Catalog number: 20442
Epoch time: 93325.67080327
Element set: 713
Inclination: 98.6146 deg
RA of node: 49.6483 deg
Eccentricity: 0.0013250
Arg of perigee: 80.8874 deg
Mean anomaly: 279.3806 deg
Mean motion: 14.30069500 rev/day
Decay rate: 9.9e-07 rev/day^2
Epoch rev: 19997
Checksum: 329

Satellite: UO-22
Catalog number: 21575
Epoch time: 93325.62459097
Element set: 413
Inclination: 98.4563 deg
RA of node: 39.0920 deg
Eccentricity: 0.0007330
Arg of perigee: 184.4976 deg
Mean anomaly: 175.6161 deg
Mean motion: 14.36866978 rev/day
Decay rate: 1.32e-06 rev/day^2
Epoch rev: 12327
Checksum: 322

Satellite: KO-23
Catalog number: 22077
Epoch time: 93325.56659606

Element set: 310
Inclination: 66.0893 deg
RA of node: 354.6876 deg
Eccentricity: 0.0005267
Arg of perigee: 339.3077 deg
Mean anomaly: 20.7715 deg
Mean motion: 12.86281948 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 6008
Checksum: 303

Satellite: AO-27
Catalog number: 22825
Epoch time: 93325.63865674
Element set: 212
Inclination: 98.6761 deg
RA of node: 38.3168 deg
Eccentricity: 0.0009527
Arg of perigee: 93.6148 deg
Mean anomaly: 266.6130 deg
Mean motion: 14.27591127 rev/day
Decay rate: 7.7e-07 rev/day^2
Epoch rev: 807
Checksum: 323

Satellite: IO-26
Catalog number: 22826
Epoch time: 93325.63461159
Element set: 213
Inclination: 98.6764 deg
RA of node: 38.3197 deg
Eccentricity: 0.0010035
Arg of perigee: 94.7836 deg
Mean anomaly: 265.4492 deg
Mean motion: 14.27693538 rev/day
Decay rate: 7.8e-07 rev/day^2
Epoch rev: 807
Checksum: 329

Satellite: KO-25
Catalog number: 22830
Epoch time: 93324.71104890
Element set: 213
Inclination: 98.5779 deg
RA of node: 36.8642 deg
Eccentricity: 0.0012529
Arg of perigee: 68.2759 deg
Mean anomaly: 291.9752 deg
Mean motion: 14.28017671 rev/day
Decay rate: 1.03e-06 rev/day^2
Epoch rev: 794

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Checksum: 315

/EX
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362. ORBS$328.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-25 03:25:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-328.w.1993@ampr.org>
Source record: 28421
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-328.W
Orbital Elements 328.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX November 24, 1993
BID: $ORBS-328.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93321.67817478
Element set: 612
Inclination: 99.0821 deg
RA of node: 4.3682 deg
Eccentricity: 0.0015882
Arg of perigee: 95.7490 deg
Mean anomaly: 264.5523 deg
Mean motion: 14.13562457 rev/day
Decay rate: 1.05e-06 rev/day^2
Epoch rev: 46046
Checksum: 314

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93323.68554173
Element set: 510
Inclination: 98.5133 deg
RA of node: 334.0643 deg
Eccentricity: 0.0012433
Arg of perigee: 218.5417 deg
Mean anomaly: 141.4895 deg
Mean motion: 14.24844816 rev/day
Decay rate: 9.6e-07 rev/day^2
Epoch rev: 37277
Checksum: 316

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93324.77430959
Element set: 212
Inclination: 82.5425 deg
RA of node: 74.3748 deg
Eccentricity: 0.0017761
Arg of perigee: 49.3727 deg
```

Mean anomaly: 310.8980 deg
Mean motion: 13.84697976 rev/day
Decay rate: 6.6e-07 rev/day^2
Epoch rev: 29351
Checksum: 344

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93327.88606867
Element set: 213
Inclination: 82.5382 deg
RA of node: 108.9623 deg
Eccentricity: 0.0018510
Arg of perigee: 57.6406 deg
Mean anomaly: 302.6575 deg
Mean motion: 13.16961911 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25623
Checksum: 308

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93323.67891070
Element set: 410
Inclination: 99.1515 deg
RA of node: 302.7055 deg
Eccentricity: 0.0012244
Arg of perigee: 5.6990 deg
Mean anomaly: 354.4307 deg
Mean motion: 14.12933644 rev/day
Decay rate: 1.56e-06 rev/day^2
Epoch rev: 26563
Checksum: 285

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93325.42782422
Element set: 213
Inclination: 82.5192 deg
RA of node: 309.5566 deg
Eccentricity: 0.0015904
Arg of perigee: 88.4579 deg
Mean anomaly: 271.8419 deg
Mean motion: 13.84349155 rev/day
Decay rate: 1.9e-07 rev/day^2
Epoch rev: 23894
Checksum: 337

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93326.70726297

Element set: 915
Inclination: 82.5547 deg
RA of node: 53.0394 deg
Eccentricity: 0.0017057
Arg of perigee: 80.9974 deg
Mean anomaly: 279.2674 deg
Mean motion: 13.16023734 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19595
Checksum: 320

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93325.62861582
Element set: 713
Inclination: 82.5482 deg
RA of node: 13.3392 deg
Eccentricity: 0.0016493
Arg of perigee: 14.8236 deg
Mean anomaly: 345.3422 deg
Mean motion: 13.84182354 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17190
Checksum: 292

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93325.69890385
Element set: 818
Inclination: 98.8527 deg
RA of node: 347.3415 deg
Eccentricity: 0.0014034
Arg of perigee: 231.3920 deg
Mean anomaly: 128.6001 deg
Mean motion: 14.01337309 rev/day
Decay rate: 2.80e-06 rev/day^2
Epoch rev: 16464
Checksum: 303

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93325.46973098
Element set: 712
Inclination: 82.5229 deg
RA of node: 311.2459 deg
Eccentricity: 0.0011806
Arg of perigee: 272.8085 deg
Mean anomaly: 87.1723 deg
Mean motion: 13.83564132 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 15903

Checksum: 297

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93327.43445415
Element set: 617
Inclination: 82.5444 deg
RA of node: 315.0567 deg
Eccentricity: 0.0013262
Arg of perigee: 341.2576 deg
Mean anomaly: 18.8056 deg
Mean motion: 13.16458338 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12428
Checksum: 286

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93323.56678881
Element set: 817
Inclination: 98.6421 deg
RA of node: 350.7456 deg
Eccentricity: 0.0013768
Arg of perigee: 121.7860 deg
Mean anomaly: 238.4659 deg
Mean motion: 14.22334412 rev/day
Decay rate: 1.68e-06 rev/day^2
Epoch rev: 13073
Checksum: 314

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93327.30300481
Element set: 614
Inclination: 82.5541 deg
RA of node: 262.1324 deg
Eccentricity: 0.0013850
Arg of perigee: 356.1728 deg
Mean anomaly: 3.9270 deg
Mean motion: 13.16825241 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 10936
Checksum: 266

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93325.65877278
Element set: 212
Inclination: 82.5509 deg
RA of node: 10.8972 deg
Eccentricity: 0.0023907

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Arg of perigee: 87.2237 deg
Mean anomaly: 273.1663 deg
Mean motion: 13.82992586 rev/day
Decay rate: 1.01e-06 rev/day^2
Epoch rev: 1140
Checksum: 308

/EX
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363. ORBS$328.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-25 03:27:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-328.m.1993@ampr.org>
Source record: 28422
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-328.M
Orbital Elements 328.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX November 24, 1993
BID: $ORBS-328.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93327.79016587
Element set: 596
Inclination: 51.6171 deg
RA of node: 137.6286 deg
Eccentricity: 0.0005040
Arg of perigee: 20.3514 deg
Mean anomaly: 339.7798 deg
Mean motion: 15.58667160 rev/day
Decay rate: 7.671e-05 rev/day^2
Epoch rev: 44399
Checksum: 336

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93326.53889941
Element set: 364
Inclination: 28.4673 deg
RA of node: 123.5668 deg
Eccentricity: 0.0004218
Arg of perigee: 266.1154 deg
Mean anomaly: 93.8990 deg
Mean motion: 14.92930899 rev/day
Decay rate: 8.18e-06 rev/day^2
Epoch rev: 19519
Checksum: 342

Satellite: GRO
Catalog number: 21225
Epoch time: 93323.10592449
Element set: 223
Inclination: 28.4613 deg
RA of node: 251.4109 deg
Eccentricity: 0.0075125
Arg of perigee: 111.9850 deg
```

Mean anomaly: 248.8518 deg
Mean motion: 15.58788576 rev/day
Decay rate: 1.6589e-04 rev/day^2
Epoch rev: 2449
Checksum: 315

Satellite: UARS
Catalog number: 21701
Epoch time: 93320.80422262
Element set: 414
Inclination: 56.9838 deg
RA of node: 290.0183 deg
Eccentricity: 0.0005706
Arg of perigee: 92.3355 deg
Mean anomaly: 267.8337 deg
Mean motion: 14.96177320 rev/day
Decay rate: -1.889e-05 rev/day^2
Epoch rev: 11913
Checksum: 296

Satellite: POSAT
Catalog number: 22829
Epoch time: 93289.11726978
Element set: 204
Inclination: 98.6763 deg
RA of node: 2.0610 deg
Eccentricity: 0.0010043
Arg of perigee: 184.4594 deg
Mean anomaly: 175.6498 deg
Mean motion: 14.27975951 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 286
Checksum: 317

/EX

364. ORBS$328.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-11-25 03:29:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-328.n.1993@ampr.org>
Source record: 28423
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-328.N
2Line Orbital Elements 328.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX November 24, 1993
BID: $ORBS-328.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93321.57691393 -.00000112 00000-0 10000-3 0 2118
2 14129 27.1956 355.7539 6019652 131.0023 299.1524 2.05880635 78414
UO-11
1 14781U 84021B 93325.57000090 .00000269 00000-0 49738-4 0 6134
2 14781 97.7960 344.9183 0010964 210.4629 149.5959 14.69087530519827
RS-10/11
1 18129U 87054A 93325.49625370 .00000016 00000-0 10683-4 0 8137
2 18129 82.9207 122.3575 0010357 239.9809 120.0325 13.72326180321420
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1 19216U 88051B 93324.87971886 -.00000221 00000-0 10000-4 0 8154
2 19216 57.8676 283.0185 7211074 328.8644 3.5221 2.09724867 41647
FO-20
1 20480U 90013C 93325.97912877 -.00000005 00000-0 14514-4 0 6104
2 20480 99.0202 152.1718 0541163 89.0188 277.2925 12.83222068177550
AO-21
1 21087U 91006A 93327.46610100 .00000084 00000-0 82657-4 0 3703
2 21087 82.9432 294.9482 0034102 299.3528 60.4149 13.74528481141311
RS-12/13
1 21089U 91007A 93327.59616256 .00000030 00000-0 25224-4 0 6147
2 21089 82.9217 163.9135 0028927 323.6427 36.2770 13.74030145140417
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1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
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2 20437 98.6041 47.2419 0011859 83.0955 277.1590 14.29805061199801
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1 20439U 90005D 93324.68304767 .00000084 00000-0 40260-4 0 7136
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2 20439 98.6140 48.1917 0012184 83.5887 276.6705 14.29861812199805
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2 20440 98.6142 48.9764 0012282 81.4113 278.8478 14.29999401199891
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2 20441 98.6145 48.4799 0012824 83.2364 277.0290 14.29976777199825
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1 20442U 90005G 93325.67080327 .00000099 00000-0 46017-4 0 7135
2 20442 98.6146 49.6483 0013250 80.8874 279.3806 14.30069500199976
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1 22825U 93061C 93325.63865674 .00000077 00000-0 39483-4 0 2128
2 22825 98.6761 38.3168 0009527 93.6148 266.6130 14.27591127 8079
IO-26
1 22826U 93061D 93325.63461159 .00000078 00000-0 39608-4 0 2130
2 22826 98.6764 38.3197 0010035 94.7836 265.4492 14.27693538 8074
KO-25
1 22830U 93061H 93324.71104890 .00000103 00000-0 49277-4 0 2131
2 22830 98.5779 36.8642 0012529 68.2759 291.9752 14.28017671 7949
NOAA-9
1 15427U 84123A 93321.67817478 .00000105 00000-0 66146-4 0 6128
2 15427 99.0821 4.3682 0015882 95.7490 264.5523 14.13562457460466
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1 16969U 86073A 93323.68554173 .00000096 00000-0 49118-4 0 5105
2 16969 98.5133 334.0643 0012433 218.5417 141.4895 14.24844816372776
MET-2/17
1 18820U 88005A 93324.77430959 .00000066 00000-0 53393-4 0 2122
2 18820 82.5425 74.3748 0017761 49.3727 310.8980 13.84697976293513
MET-3/2
1 19336U 88064A 93327.88606867 .00000043 00000-0 10000-3 0 2131
2 19336 82.5382 108.9623 0018510 57.6406 302.6575 13.16961911256238
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1 19531U 88089A 93323.67891070 .00000156 00000-0 94238-4 0 4100
2 19531 99.1515 302.7055 0012244 5.6990 354.4307 14.12933644265630
MET-2/18
1 19851U 89018A 93325.42782422 .00000019 00000-0 11488-4 0 2138
2 19851 82.5192 309.5566 0015904 88.4579 271.8419 13.84349155238948
MET-3/3
1 20305U 89086A 93326.70726297 .00000043 00000-0 10000-3 0 9153
2 20305 82.5547 53.0394 0017057 80.9974 279.2674 13.16023734195950
MET-2/19
1 20670U 90057A 93325.62861582 .00000015 00000-0 79036-5 0 7136
2 20670 82.5482 13.3392 0016493 14.8236 345.3422 13.84182354171904
FY-1/2
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1 20788U 90081A 93325.69890385 .00000280 00000-0 20817-3 0 8184
2 20788 98.8527 347.3415 0014034 231.3920 128.6001 14.01337309164645
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1 20826U 90086A 93325.46973098 .00000030 00000-0 21632-4 0 7123
2 20826 82.5229 311.2459 0011806 272.8085 87.1723 13.83564132159033
MET-3/4
1 21232U 91030A 93327.43445415 .00000043 00000-0 10000-3 0 6175
2 21232 82.5444 315.0567 0013262 341.2576 18.8056 13.16458338124285
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1 21263U 91032A 93323.56678881 .00000168 00000-0 84215-4 0 8176
2 21263 98.6421 350.7456 0013768 121.7860 238.4659 14.22334412130733
MET-3/5
1 21655U 91056A 93327.30300481 .00000043 00000-0 10000-3 0 6148
2 21655 82.5541 262.1324 0013850 356.1728 3.9270 13.16825241109368
MET-2/21
1 22782U 93055A 93325.65877278 .00000101 00000-0 87052-4 0 2121
2 22782 82.5509 10.8972 0023907 87.2237 273.1663 13.82992586 11406
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1 16609U 86017A 93327.79016587 .00007671 00000-0 10427-3 0 5962
2 16609 51.6171 137.6286 0005040 20.3514 339.7798 15.58667160443992
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1 20580U 90037B 93326.53889941 .00000818 00000-0 69765-4 0 3644
2 20580 28.4673 123.5668 0004218 266.1154 93.8990 14.92930899195195
GRO
1 21225U 91027B 93323.10592449 .00016589 00000-0 17587-3 0 2235
2 21225 28.4613 251.4109 0075125 111.9850 248.8518 15.58788576 24490
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1 21701U 91063B 93320.80422262 -.00001889 00000-0 -15578-3 0 4142
2 21701 56.9838 290.0183 0005706 92.3355 267.8337 14.96177320119131
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1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
/EX
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365. how easy to receive?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-26 08:19:08 UTC
From: WIESMANN@IAP.unibe.ch
Message-ID: <1993Nov26.081908.4842@aragorn.unibe.ch>
Source record: 28425

Hi,

I'm thinking about building a 136 MHz receiver to get the meteosats.
What kind of antenna is needed to be successfull (gain)? And is it
possible to decode the data with an ordinary weather fax converter?
Any help is appreciated.

vy 73 de Andreas HB9GAV

--
Andreas Wiesmann Packet: hb9gav@hb9pd.che.eu
Institute of Applied Physics E-Mail: wiesmann@iap.unibe.ch
University of Bern
Sidlerstrasse 5 Phone: +41 31 631 45 90
CH-3012 Bern Fax: +41 31 631 35 65

366. 2-line Kepler els.??

Newsgroup: rec.radio.amateur.space
Date: 1993-11-26 16:13:50 UTC
From: perry@jpunix.com
Message-ID: <CH3x32.2xJ@jpunix.com>
Source record: 28426

I know this is probably a FAQ but where can I FTP the latest 2-line
els. to plug into my satellite tracking program?

--
John A. Perry (KG5RG) - perry@jpunix.com
jpunix!perry

367. (none)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-26 20:30:40 UTC
From: uucp@asarin.ORG.AR
Message-ID: <gate.TPgNDc1w165w@asarin.org.ar>
Source record: 28427

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$ORBS-326.2LN

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1 14129U 83058B 93321.57691393 -.00000112 00000-0 10000-3 0 2118
2 14129 27.1956 355.7539 6019652 131.0023 299.1524 2.05880635 50447
UoSat 2
1 14781U 84021B 93325.57000090 .00000269 00000-0 49738-4 0 6134
2 14781 97.7960 344.9183 0010964 210.4629 149.5959 14.69087530519827
RS-10/11
1 18129U 87054A 93325.49625370 .00000016 00000-0 10683-4 0 8137
2 18129 82.9207 122.3575 0010357 239.9809 120.0325 13.72326180321420
AO-13
1 19216U 88051B 93324.87971886 -.00000221 00000-0 10000-4 0 8154
2 19216 57.8676 283.0185 7211074 328.8644 3.5221 2.09724867 10148
UO-14
1 20437U 90005B 93324.75934626 .00000124 00000-0 55928-4 0 9139
2 20437 98.6041 47.2419 0011859 83.0955 277.1590 14.29805061199801
UO-15
1 20438U 90005C 93324.66916981 .00000052 00000-0 28410-4 0 7138
2 20438 98.6067 46.3509 0010886 85.0761 275.1662 14.29151237199724
PACSAT
1 20439U 90005D 93324.68304767 .00000084 00000-0 40260-4 0 7136
2 20439 98.6140 48.1917 0012184 83.5887 276.6705 14.29861812199805
DO-17
1 20440U 90005E 93320.66928486 .00000060 00000-0 31121-4 0 7121
2 20440 98.6144 44.4763 0012250 94.2945 265.9628 14.29997894199240
WO-18
1 20441U 90005F 93324.69934066 .00000081 00000-0 39080-4 0 7147
2 20441 98.6145 48.4799 0012824 83.2364 277.0290 14.29976777199825
LO-19
1 20442U 90005G 93320.70317511 .00000061 00000-0 31205-4 0 7123
2 20442 98.6151 44.7345 0013139 93.7468 266.5215 14.30068015199267
FO-20
1 20480U 90013C 93325.97912877 -.00000005 00000-0 14514-4 0 6104
2 20480 99.0202 152.1718 0541163 89.0188 277.2925 12.83222068177550
AO-21
1 21087U 91006A 93323.53527447 .00000084 00000-0 82657-4 0 3696
2 21087 82.9422 297.8587 0034459 310.5954 49.2197 13.74528416140777
RS-12/13
1 21089U 91007A 93323.15418343 .00000034 00000-0 29298-4 0 6130
2 21089 82.9208 167.2076 0028935 335.9712 24.0281 13.74029882139797
UO-22
1 21575U 91050B 93325.62459097 .00000132 00000-0 51577-4 0 4135
2 21575 98.4563 39.0920 0007330 184.4976 175.6161 14.36866978123272
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TOPEX R/B
1 22079U 92052D 93320.65318160 -.00000002 00000-0 10000-3 0 3097
2 22079 66.0743 19.3391 0075426 291.9279 67.3722 12.77663266 59194
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
KO-25
1 22825U 93061C 93325.63865674 .00000077 00000-0 39483-4 0 2128
2 22825 98.6761 38.3168 0009527 93.6148 266.6130 14.27591127 8079
POSAT-1
1 22826U 93061D 93325.63461159 .00000078 00000-0 39608-4 0 2130
2 22826 98.6764 38.3197 0010035 94.7836 265.4492 14.27693538 8074
HEATHSAT
1 22827U 93061E 93325.63062458 .00000131 00000-0 60982-4 0 2757
2 22827 98.6738 38.3070 0010219 83.4992 276.7343 14.27794239 8078
ITAMSAT
1 22828U 93061F 93325.49046433 .00000224 00000-0 98517-4 0 2115
2 22828 98.6722 38.1667 0010398 83.6313 276.6045 14.27795949 8054
EYESAT-1
1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
Glonass 34
1 19163U 88043A 93325.53794313 .00000024 00000-0 10000-3 0 8124
2 19163 64.9976 117.4118 0008108 169.7076 190.3253 2.13103128 42234
Glonass 36
1 19165U 88043C 93318.55483137 .00000024 00000-0 10000-3 0 2077
2 19165 64.9730 117.6244 0003887 334.7239 25.2373 2.13101814 42699
Glonass 39
1 19503U 88085C 93323.27212437 -.00000017 00000-0 10000-3 0 1091
2 19503 65.7469 356.3992 0006133 176.2057 183.8479 2.13102194 40293
Glonass 40
1 19749U 89001A 93320.96570129 .00000021 00000-0 10000-3 0 3120
2 19749 64.9320 117.1482 0004999 259.5931 100.3305 2.13100963 37765
Glonass 41
1 19750U 89001B 93325.71520249 .00000024 00000-0 10000-3 0 2085
2 19750 64.9598 117.0392 0006823 249.0161 110.9043 2.13101846 37879
Glonass 44
1 20619U 90045A 93324.15086071 -.00000018 00000-0 00000+0 0 9376
2 20619 65.3400 356.0710 0025999 215.2877 144.5942 2.13102670 27286
Glonass 45
1 20620U 90045B 93323.33088509 -.00000018 00000-0 00000+0 0 9285
2 20620 65.3354 356.1013 0005380 27.6345 332.4597 2.13102494 27288
Glonass 46
1 20621U 90045C 93321.04824754 -.00000017 00000-0 10000-3 0 6137
2 20621 65.3551 356.2221 0014731 199.9154 160.0679 2.13102316 27246
Glonass 47
1 21006U 90110A 93323.42590864 .00000021 00000-0 00000+0 0 5446
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2 21006 64.9093 116.4394 0060064 185.6019 174.3215 2.13102496 22966
Glonass 48
1 21007U 90110B 93324.07954711 .00000022 00000-0 00000+0 0 6323
2 21007 64.9289 116.4729 0037882 177.7611 182.2547 2.13100762 22980
Glonass 49
1 21008U 90110C 93323.02702485 .00000021 00000-0 00000+0 0 6326
2 21008 64.9138 116.4693 0007634 280.3590 79.5610 2.13099931 22932
Glonass 50
1 21216U 91025A 93324.38241326 -.00000018 00000-0 10000-3 0 2097
2 21216 65.0934 355.9021 0011593 214.5837 145.3959 2.13103341 20494
Glonass 51
1 21217U 91025B 93325.38534585 -.00000018 00000-0 10000-3 0 5331
2 21217 65.0817 355.8776 0012954 237.2330 122.6982 2.13101539 20506
Glonass 52
1 21218U 91025C 93318.46172122 -.00000016 00000-0 10000-3 0 1107
2 21218 65.1095 356.0896 0013044 277.9408 81.9941 2.13099064 20365
Glonass 53
1 21853U 92005A 93324.30564285 .00000022 00000-0 10000-3 0 8121
2 21853 64.8493 116.1391 0006928 192.9784 167.0047 2.13102242 14098
Glonass 54
1 21854U 92005B 93324.59845265 .00000022 00000-0 00000+0 0 8353
2 21854 64.8689 116.1265 0016020 20.4378 339.6153 2.13102589 14082
Glonass 55
1 21855U 92005C 93324.65874153 .00000022 00000-0 00000+0 0 8281
2 21855 64.8627 116.1265 0007245 192.8555 167.1235 2.13101828 14063
Glonass 56
1 22056U 92047A 93323.62116437 -.00000018 00000-0 00000+0 0 7321
2 22056 64.9269 356.1682 0007059 264.3267 95.6699 2.13102793 10143
Glonass 57
1 22057U 92047B 93325.32262322 -.00000018 00000-0 00000+0 0 7359
2 22057 64.9390 356.1219 0008406 308.5571 51.4175 2.13102678 10175
Glonass 58
1 22058U 92047C 93324.32521861 -.00000018 00000-0 00000+0 0 7355
2 22058 64.9326 356.1658 0011857 271.2397 88.6898 2.13103118 10183
Glonass 59
1 22512U 93010A 93325.24467792 .00000023 00000-0 00000+0 0 4335
2 22512 64.8815 115.9562 0009300 187.1878 172.7946 2.13101790 5686
Glonass 60
1 22513U 93010B 93325.18536648 .00000023 00000-0 00000+0 0 4426
2 22513 64.8777 115.9755 0007241 180.9188 179.0562 2.13104652 5892
Glonass 61
1 22514U 93010C 93323.54363036 .00000021 00000-0 00000+0 0 4297
2 22514 64.8837 116.0052 0014119 184.6222 175.3561 2.13101621 5839
GORIZONT 1
1 11158U 78118A 93319.64658329 -.00000178 00000-0 10000-3 0 9158
2 11158 22.2813 55.2382 3221100 247.7626 75.3130 1.00296565 3594
GORIZONT 2
1 11440U 79062A 93324.62136803 -.00000136 00000-0 10000-3 0 1171
2 11440 11.3822 46.1870 0006464 27.1017 291.1991 1.00304332 18729
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GORIZONT 4
1 11841U 80049A 93311.91733115 .00000007 00000-0 10000-3 0 1075
2 11841 10.8529 49.3194 0004679 19.1015 194.2803 0.98626449 46741
GORIZONT 5
1 13092U 82020A 93324.27502802 -.00000099 00000-0 10000-3 0 1056
2 13092 9.8781 54.2845 0033477 288.8025 130.3267 0.98531555 4372
GORIZONT 6
1 13624U 82103A 93309.09057626 -.00000169 00000-0 10000-3 0 3040
2 13624 9.0024 52.9082 0004543 345.6507 307.3232 1.00377710 2069
GORIZONT 7
1 14160U 83066A 93319.71489543 -.00000011 00000-0 10000-3 0 1125
2 14160 7.9671 56.6293 0012448 28.7683 282.0414 0.98344019 37737
GORIZONT 8
1 14532U 83118A 93321.00000000 -.00000112 00000-0 10000-3 0 2042
2 14532 7.5994 57.2540 0024806 232.4583 129.8741 0.98273932 3829
GORIZONT 9
1 14940U 84041A 93321.77959544 -.00000093 00000-0 10000-3 0 3062
2 14940 7.1964 57.4878 0000749 91.2176 265.0773 1.00322901 2697
GORIZONT 10
1 15144U 84078A 93311.57045376 .00000148 00000-0 10000-3 0 2097
2 15144 6.8573 58.5790 0002585 5.7198 24.7561 1.00230918 35186
GORIZONT 11
1 15484U 85007A 93298.88039294 .00000176 00000-0 10000-3 0 3044
2 15484 6.3918 59.4692 0009002 359.0728 324.9243 1.00356881 33073
GORIZONT 12
1 16769U 86044A 93320.60901065 -.00000183 00000-0 10000-3 0 8069
2 16769 5.2823 61.9843 0007415 250.3060 47.8894 1.00343361 27937
GORIZONT 13
1 17083U 86090A 93313.94086204 -.00000095 00000-0 10000-3 0 8060
2 17083 4.9295 64.2846 0014938 59.3875 251.8513 0.96725960 3497
GORIZONT 14
1 17969U 87040A 93324.81159874 -.00000071 00000-0 10000-3 0 3082
2 17969 6.6855 61.0583 0028490 263.6735 328.1132 0.97655809 3677
GORIZONT 15
1 19017U 88028A 93314.58809771 -.00000034 00000-0 10000-3 0 1117
2 19017 3.6798 71.8965 0033792 243.0318 170.4383 0.97826975 3208
GORIZONT 16
1 19397U 88071A 93315.04148530 -.00000167 00000-0 10000-3 0 8054
2 19397 3.2166 66.6209 0012046 137.0371 203.9211 0.99986547 19132
GORIZONT 17
1 19765U 89004A 93323.64968970 -.00000290 00000-0 00000+0 0 3319
2 19765 2.7874 67.0457 0000625 298.7493 60.9483 1.00277323 1637
GORIZONT 18
1 20107U 89052A 93323.63711157 -.00000258 00000-0 00000+0 0 2319
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GORIZONT 19
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GORIZONT 21
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GORIZONT 22
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2 20953 1.1372 68.8302 0002696 221.7039 137.4766 1.00278148 11129
GORIZONT 23
1 21533U 91046A 93324.62884748 -.00000002 00000-0 10000-3 0 7098
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1 21759U 91074A 93324.61180020 -.00000110 00000-0 00000+0 0 8311
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GORIZONT 25
1 21922U 92017A 93323.55062565 -.00000295 00000-0 00000+0 0 6295
2 21922 0.1878 323.4617 0001538 305.0977 91.4405 1.00263821 5973
GORIZONT 26
1 22041U 92043A 93321.87216954 -.00000063 00000-0 00000+0 0 6274
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Gorizont 28
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2 16129 64.5962 49.5901 0131657 141.7303 219.2381 2.00563677 5987
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2 19802 55.0742 147.9742 0035619 173.1786 186.9183 2.00568272 34876
GPS BII-02 (PRN 02)
1 20061U 89044A 93323.17086017 -.00000027 00000-0 10000-3 0 8155
2 20061 54.7551 325.0192 0125086 205.2401 154.1671 2.00565684 32574
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1 20185U 89064A 93324.00448879 .00000029 00000-0 10000-3 0 8178
2 20185 54.9092 148.6676 0005546 232.1303 127.8680 2.00552939 31167
GPS BII-04 (PRN 19)
1 20302U 89085A 93319.05153797 -.00000020 00000-0 10000-3 0 8175
2 20302 53.7058 265.6654 0006474 310.5597 49.3758 2.00561334 29867
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2 20361 55.4089 90.7906 0071871 102.9814 257.7947 2.00566861 19369
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2 20452 54.0801 204.9745 0053490 70.4997 290.2580 2.00565618 27975
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2 20533 55.0895 325.5213 0040207 84.1212 276.3624 2.00563199 26675
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2 20724 54.7156 146.3291 0108382 155.2513 205.3072 2.00562320 24167
GPS BII-09 (PRN 15)
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GPS BIIA-11 (PRN 24)
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GPS BIIA-15 (PRN 27)
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GPS BIIA-16 (PRN 01)
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GPS BIIA-17 (PRN 29)
1 22275U 92089A 93325.89582733 .00000015 00000-0 10000-3 0 3166
2 22275 54.6810 204.8075 0051326 256.0150 103.3153 2.00553245 6745
GPS BIIA-18 (PRN 22)
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2 22446 54.7597 325.9912 0068229 335.8421 23.8472 2.00552996 5684
GPS BIIA-19 (PRN 31)
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2 22581 55.0079 26.0469 0041164 33.5926 326.6986 2.00575934 4769
GPS BIIA-20 (PRN 07)
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2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21 (PRN 09)
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GPS BIIA-22 (PRN 05)
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2 14328 0.0705 81.8630 0002766 138.5316 143.4204 1.00270108 37384
GALAXY 2
1 14365U 83098A 93321.08274453 -.00000226 00000-0 10000-3 0 9252
2 14365 0.0718 77.4650 0007620 332.0533 322.4749 1.00267743 13005
INTELSAT 5 F-8
1 14786U 84023A 93320.65803884 .00000079 00000-0 10000-3 0 5213
2 14786 2.2639 72.2290 0003383 160.8112 239.5413 1.00273816 36451
SPACENET 1
1 14985U 84049A 93323.51639197 -.00000335 00000-0 00000+0 0 2313
2 14985 0.0690 245.6073 0000656 338.4847 135.9205 1.00267319 12271
GORIZONT 10
1 15144U 84078A 93311.57045376 .00000148 00000-0 10000-3 0 2097
2 15144 6.8573 58.5790 0002585 5.7198 24.7561 1.00230918 35186
SBS 4
1 15235U 84093B 93321.06667003 -.00000215 00000-0 10000-3 0 2240
2 15235 0.7529 77.2440 0001519 148.4679 137.4202 1.00269028 10569
TELSTAR 3C (T-2)
1 15237U 84093D 93323.00144316 -.00000179 00000-0 10000-3 0 2301
2 15237 0.0622 103.1617 0001066 121.9208 108.4337 1.00269877 6007
GALAXY 3
1 15308U 84101A 93325.08501133 -.00000134 00000-0 10000-3 0 3193
2 15308 0.0378 52.3661 0004446 73.6742 231.2599 1.00272190 33488
ANIK D2 ("F4")
1 15383U 84113B 93310.81574690 -.00000133 00000-0 00000+0 0 1093
2 15383 0.6282 78.2613 0028869 190.3508 91.4791 1.00286285 7219
SPACENET 2
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1 15385U 84114A 93321.13745971 -.00000241 00000-0 10000-3 0 9199
2 15385 0.0418 91.5056 0001446 205.9224 99.2645 1.00268416 7989
GORIZONT 11
1 15484U 85007A 93298.88039294 .00000176 00000-0 10000-3 0 3044
2 15484 6.3918 59.4692 0009002 359.0728 324.9243 1.00356881 33073
ANIK C1
1 15642U 85028B 93325.01491222 -.00000232 00000-0 10000-3 0 1213
2 15642 0.0072 227.8824 0000881 344.3464 141.3322 1.00267710 37412
GSTAR 1
1 15677U 85035A 93323.33347198 -.00000076 00000-0 10000-3 0 8172
2 15677 0.0192 215.4377 0000851 322.0653 257.9471 1.00271298 31003
MORELOS A
1 15824U 85048B 93325.13259229 -.00000008 00000-0 10000-3 0 9218
2 15824 0.0563 133.1914 0001328 71.3381 149.9273 1.00273657 1451
TELSTAR 3D (T-3)
1 15826U 85048D 93323.49500038 .00000050 00000-0 30000-3 0 1225
2 15826 0.0452 97.3336 0000575 151.0595 225.3528 1.00273913 10610
INTELSAT 5A F-11
1 15873U 85055A 93324.30626863 .00000060 00000-0 00000+0 0 2204
2 15873 0.7736 77.9886 0003287 154.8030 113.8487 1.00274405 5386
AUSSAT 1
1 15993U 85076B 93317.79269968 -.00000008 00000-0 10000-3 0 7094
2 15993 0.7962 80.0132 0003709 57.2809 213.7047 0.99767145 830
ASC 1
1 15994U 85076C 93321.54122250 .00000079 00000-0 10000-3 0 62
2 15994 0.0257 188.8947 0002759 32.5093 262.0744 1.00274240 346
INTELSAT 5A F-12
1 16101U 85087A 93320.10528561 .00000018 00000-0 00000+0 0 5187
2 16101 0.2128 86.6661 0002379 150.7203 214.8430 1.00275169 12147
MORELOS B
1 16274U 85109B 93323.37600150 .00000013 00000-0 10000-3 0 8239
2 16274 0.0227 1.2786 0001345 220.5739 215.1304 1.00272512 18621
AUSSAT 2
1 16275U 85109C 93325.03907701 -.00000047 00000-0 10000-3 0 2206
2 16275 0.5241 79.9457 0001608 191.7152 326.4767 1.00271619 19098
SATCOM KU-2
1 16276U 85109D 93320.63789872 -.00000198 00000-0 10000-3 0 9210
2 16276 0.0252 21.1230 0001477 158.0264 25.2615 1.00268691 29237
SATCOM KU-1
1 16482U 86003B 93325.89748273 -.00000178 00000-0 10000-3 0 2206
2 16482 0.0322 29.7730 0002160 220.1771 49.0991 1.00269084 6083
GSTAR 2
1 16649U 86026A 93319.32059759 .00000063 00000-0 10000-3 0 5150
2 16649 0.0422 137.7781 0001868 52.1775 214.9476 1.00275581 5928
GORIZONT 14
1 17969U 87040A 93324.81159874 -.00000071 00000-0 10000-3 0 3082
2 17969 6.6855 61.0583 0028490 263.6735 328.1132 0.97655809 3677
AUSSAT K3
1 18350U 87078A 93321.43313035 -.00000121 00000-0 10000-3 0 7141
2 18350 0.0197 141.2199 0001722 83.4288 143.7814 1.00270581 22138
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1 18951U 88018A 93325.07971825 -.00000169 00000-0 10000-3 0 9159
2 18951 0.0377 47.4597 0000274 256.2366 58.0921 1.00271478 5822
TELECOM 1C
1 18952U 88018B 93313.94717174 .00000048 00000-0 10000-3 0 7083
2 18952 0.0356 95.2709 0001387 48.5357 249.3111 1.00275536 4660
GORIZONT 15
1 19017U 88028A 93314.58809771 -.00000034 00000-0 10000-3 0 1117
2 19017 3.6798 71.8965 0033792 243.0318 170.4383 0.97826975 3208
INTELSAT 5A F-13
1 19121U 88040A 93317.04756235 -.00000257 00000-0 10000-3 0 4207
2 19121 0.0109 220.7814 0001801 22.8621 132.7088 1.00271401 7070
PAS 1
1 19217U 88051C 93317.63229189 -.00000246 00000-0 10000-3 0 8137
2 19217 0.0140 198.5743 0001356 35.0368 1.8261 1.00269908 19333
EUTELSAT 1 F5
1 19331U 88063B 93323.79633433 .00000156 00000-0 10000-3 0 7152
2 19331 0.0753 52.1181 0008379 207.2421 107.5651 1.00272500 45659
GSTAR 3
1 19483U 88081A 93318.05394911 -.00000135 00000-0 10000-3 0 8146
2 19483 5.3810 74.5161 0002846 110.1490 154.9079 1.00270491 15256
SBS 5
1 19484U 88081B 93316.29989123 .00000051 00000-0 30000-3 0 9190
2 19484 0.0303 11.8448 0001234 176.2601 208.4227 1.00275059 10547
TDRS 3
1 19548U 88091B 93325.58476903 -.00000254 00000-0 10000-3 0 8194
2 19548 0.5537 78.9469 0003092 146.5226 343.8820 1.00271517 6123
TDF 1
1 19621U 88098A 93315.52233231 -.00000118 00000-0 10000-3 0 7122
2 19621 0.0353 175.3391 0001093 120.4571 284.1292 1.00270835 15745
ASTRA 1A
1 19688U 88109B 93324.84568824 .00000146 00000-0 10000-3 0 7122
2 19688 0.0307 299.7210 0017898 339.8271 103.8209 1.00273220 3317
TDRS 4
1 19883U 89021B 93325.07143020 -.00000237 00000-0 00000+0 0 8157
2 19883 0.0922 65.0451 0005435 251.6000 88.1119 1.00267419 87380
TELE X
1 19919U 89027A 93269.09554965 .00000049 00000-0 10000-3 0 7037
2 19919 0.0202 119.6777 0005118 51.3187 233.3096 1.00274860 5440
DFS 1
1 20041U 89041B 93312.97299571 .00000183 00000-0 10000-3 0 6089
2 20041 0.0958 169.7325 0242882 309.5626 312.2940 1.00269566 15902
OLYMPUS
1 20122U 89053A 93316.81093942 -.00000006 00000-0 10000-3 0 8091
2 20122 1.3579 79.5874 0022093 13.5502 215.3741 1.01368103 181
TV SAT 2
1 20168U 89062A 93323.44177358 -.00000123 00000-0 10000-3 0 8148
2 20168 0.0249 319.8461 0004122 272.7243 325.7584 1.00270269 15931
BSB R-1
1 20193U 89067A 93323.31070913 -.00000196 00000-0 10000-3 0 7145
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2 20193 0.0221 4.4716 0001281 194.2417 300.4982 1.00269484 15561
1989-077A
1 20253U 89077A 93320.92004204 -.00000159 00000-0 10000-3 0 8080
2 20253 2.5357 322.5623 0003612 266.0476 135.0173 1.00260624141346
GORIZONT 19
1 20263U 89081A 93322.75829626 -.00000257 00000-0 00000+0 0 9368
2 20263 2.2107 67.6951 0000377 347.1780 12.4101 1.00282621 15184
INTELSAT 6 F-3
1 20523U 90021A 93321.95100523 -.00000213 00000-0 20000-3 0 3162
2 20523 0.0147 336.3972 0000655 259.3126 129.1493 1.00268888 6492
INTELSAT VI F4
1 20667U 90056A 93320.68614126 .00000075 00000-0 10000-3 0 6131
2 20667 0.0125 338.8919 0001558 220.1098 163.7843 1.00271848 5809
TDF 2
1 20705U 90063A 93324.92972172 -.00000120 00000-0 10000-3 0 6144
2 20705 0.0483 330.1213 0002821 231.0349 174.7015 1.00270909 15839
DFS 2
1 20706U 90063B 93322.89930791 .00000176 00000-0 00000+0 0 6145
2 20706 0.0185 251.6234 0028565 26.2699 132.0646 1.00277126 4365
BSB R-2
1 20762U 90074A 93323.95212330 .00000017 00000-0 00000+0 0 6132
2 20762 0.0144 41.6940 0001595 163.8463 195.4190 1.00272986 12190
EUTELSAT II F1
1 20777U 90079B 93324.99557653 .00000110 00000-0 00000+0 0 7122
2 20777 0.0454 55.6691 0081122 233.5064 141.5619 1.00270323 68
SBS 6
1 20872U 90091A 93323.40643908 -.00000100 00000-0 00000+0 0 8161
2 20872 0.0224 20.0758 0002355 201.1928 244.4444 1.00269556 7152
GALAXY VI
1 20873U 90091B 93324.73557833 -.00000076 00000-0 10000-3 0 7223
2 20873 0.0315 141.0460 0001474 66.4217 14.2260 1.00271310 7174
SATCOM I (SATCOM C1)
1 20945U 90100A 93325.20349275 .00000123 00000-0 00000+0 0 6244
2 20945 0.0719 82.7681 0002046 147.6781 126.0061 1.00274753 8875
GSTAR IV
1 20946U 90100B 93325.97121288 -.00000062 00000-0 00000+0 0 7177
2 20946 0.0181 209.8057 0000700 67.9070 27.9032 1.00272425 5977
EUTELSAT II F2
1 21056U 91003B 93266.93560756 .00000072 00000-0 10000-3 0 5038
2 21056 0.1422 127.6960 0234704 92.0648 127.7330 1.00290420 5337
ASTRA 1B
1 21139U 91015A 93286.99152782 .00000145 00000-0 10000-3 0 5038
2 21139 0.0408 121.2513 0063849 334.3449 303.7696 1.00279085 2788
ANIK E2
1 21222U 91026A 93321.54865058 -.00000048 00000-0 10000-3 0 6125
2 21222 0.0133 22.3123 0002604 185.4838 299.0353 1.00271833 6721
SPACENET 4 (ASC 2)
1 21227U 91028A 93325.98245514 -.00000087 00000-0 10000-3 0 7150
2 21227 0.0116 146.4849 0000752 96.7898 70.4208 1.00271479 7640
AURORA II
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1 21392U 91037A 93322.05610478 .00000130 00000-0 10000-3 0 6239
2 21392 0.0793 93.7287 0001952 54.5267 150.0301 1.00271817 8612
INTELSAT 6 F-5
1 21653U 91055A 93322.14714462 -.00000159 00000-0 10000-3 0 5137
2 21653 0.0124 25.2846 0000851 210.3324 210.0842 1.00270135 8297
ANIK-E1
1 21726U 91067A 93322.35452491 -.00000024 00000-0 10000-3 0 6193
2 21726 0.0569 74.0129 0001973 143.4630 216.4728 1.00272385 1441
INTELSAT VI-F1
1 21765U 91075A 93323.47277801 -.00000177 00000-0 50000-3 0 5157
2 21765 0.0055 207.3684 0000992 16.8105 337.0362 1.00269796 7465
EUTELSAT II
1 21803U 91083A 93319.92155103 .00000133 00000-0 10000-3 0 4082
2 21803 0.0482 96.1501 0012778 2.8908 303.8979 1.00276337 3094
TELECOM 2A
1 21813U 91084A 93315.33720816 -.00000037 00000-0 10000-3 0 5135
2 21813 0.0200 321.4457 0005292 273.1396 289.3594 1.00272553 5802
GALAXY 5
1 21906U 92013A 93322.39530230 .00000062 00000-0 10000-3 0 4264
2 21906 0.0126 37.7444 0000823 205.2241 191.7818 1.00273538 10709
INTELSAT K
1 21989U 92032A 93321.92928887 -.00000140 00000-0 10000-3 0 4182
2 21989 0.0634 82.7189 0001540 171.1641 116.1202 1.00269461 15918
AUSSAT B1
1 22087U 92054A 93323.30160991 -.00000085 00000-0 10000-3 0 3114
2 22087 0.0507 97.3888 0002732 124.7928 104.7516 1.00271045 16149
SATCOM C4
1 22096U 92057A 93318.56771391 .00000115 00000-0 10000-3 0 5262
2 22096 0.0768 40.1596 0000879 208.5828 234.2435 1.00273623 6355
HISPASAT 1A
1 22116U 92060A 93318.03939922 -.00000189 00000-0 10000-3 0 3199
2 22116 0.0509 94.3723 0001912 117.4154 185.5328 1.00269379 4364
SATCOM C3
1 22117U 92060B 93321.62479435 .00000094 00000-0 10000-3 0 3180
2 22117 0.0952 65.6156 0001327 196.2797 248.7169 1.00275759 4326
DFS 3
1 22175U 92066A 93324.85257341 .00000164 00000-0 00000+0 0 3125
2 22175 0.0218 228.6874 0002437 313.3870 208.2391 1.00274168 3959
GALAXY VII
1 22205U 92072A 93325.08697183 -.00000147 00000-0 10000-3 0 2209
2 22205 0.0333 60.7741 0001668 162.9958 136.6592 1.00271670 3894
GALAXY IV
1 22694U 93039A 93299.61620370 -.00000104 00000-0 10000-3 0 2054
2 22694 0.0117 174.0717 0003030 29.2128 314.5276 1.00271085 1161
ATLAS CENTAUR 2
1 00694U 63047A 93324.84150070 .00001019 00000-0 14682-3 0 2195
2 00694 30.3573 256.9068 0686134 97.4382 270.4618 13.78127384483309
1964-002A
1 00733U 64002A 93325.64302109 .00000107 00000-0 51181-4 0 3141
2 00733 98.9993 40.9495 0035269 319.2167 40.6362 14.28645453551483
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1964-031C
1 00815U 64031C 93323.97261395 .00000076 00000-0 43228-4 0 2146
2 00815 99.8251 91.9631 0011831 233.3638 126.6443 14.24110935525447
COSMOS 44 R/B
1 00877U 64053B 93325.62027421 .00000165 00000-0 49910-4 0 6149
2 00877 65.0816 159.9232 0087239 247.8453 111.3441 14.54680840547183
COSMOS 100
1 01843U 65106A 93324.87245994 .00001566 00000-0 84408-4 0 2149
2 01843 64.9958 252.6974 0048833 145.1501 215.2887 15.15755123516423
COSMOS 100 R/B
1 01844U 65106B 93324.69034833 .00005275 00000-0 17058-3 0 1177
2 01844 64.9870 73.7310 0019742 260.3697 99.5308 15.33026200521442
COSMOS 158 R/B
1 02802U 67045B 93325.40055734 .00000082 00000-0 30192-4 0 5146
2 02802 74.0118 297.8563 0072561 257.3405 101.9630 14.39081534388470
COSMOS 185 R/B
1 03019U 67104B 93320.67322821 .00003800 00000-0 17181-3 0 8147
2 03019 64.0587 290.4692 0183432 301.6287 56.7222 15.08927215347193
COSMOS 220 R/B
1 03230U 68040B 93324.43652748 .00000485 00000-0 78657-4 0 9136
2 03230 74.0404 309.9409 0042761 7.0700 353.1122 14.72060669360824
OAO 2
1 03597U 68110A 93325.38907158 .00000081 00000-0 27037-4 0 5137
2 03597 34.9985 330.3692 0006643 306.7045 53.3035 14.42205898312743
ISIS 1
1 03669U 69009A 93324.14140281 .00000056 00000-0 34461-4 0 3100
2 03669 88.4342 19.1622 1723590 78.0970 300.7362 11.27008128 17924
METEOR 1-2 R/B
1 04120U 69084B 93320.67826104 .00005719 00000-0 16214-3 0 7194
2 04120 81.2360 35.6356 0048516 276.9941 82.6006 15.34830055310964
SERT 2
1 04327U 70009A 93325.34878605 .00000056 00000-0 10000-3 0 2139
2 04327 99.2527 92.1840 0005268 78.9634 281.2096 13.57738355178959
MAO 1 R/B
1 04392U 70034B 93323.70068120 .00011936 00000-0 86831-3 0 8253
2 04392 68.3623 43.2677 0493033 153.9658 208.6772 14.39565427141662
METEOR 1-6 R/B
1 04584U 70085B 93325.69514643 .00002771 00000-0 10981-3 0 2173
2 04584 81.1969 209.3071 0062653 19.4630 340.9144 15.23178778256573
COSMOS 389
1 04813U 70113A 93325.63949801 .00000930 00000-0 69067-4 0 8173
2 04813 81.1746 166.8462 0020631 75.4759 284.8798 15.02444457238552
COSMOS 398
1 04966U 71016A 93325.62142779 .00116227 32569-4 28531-3 0 7976
2 04966 51.4570 36.7532 1229841 130.1766 241.3226 13.40603334744402
COSMOS 405 R/B
1 05118U 71028B 93325.36915273 .00000632 00000-0 69780-4 0 1134
2 05118 81.2447 89.6525 0066706 267.9100 91.4481 14.85222698215178
METEOR 1-8 R/B
1 05143U 71031B 93321.16587629 .00002453 00000-0 97800-4 0 2150
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2 05143 81.2370 229.3094 0047968 115.6305 245.5654 15.23892434231143
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1 05282U 71052B 93325.43862472 .00008760 00000-0 40579-3 0 9191
2 05282 73.9734 313.9367 0595562 333.8460 23.5984 14.31533888116376
METEOR 1-9 R/B
1 05328U 71059B 93320.62161758 .00001804 00000-0 81888-4 0 8138
2 05328 81.1872 265.0603 0049383 205.9794 153.8984 15.19405414215372
ASTEX 1
1 05560U 71089A 93323.88651401 .00000201 00000-0 61841-4 0 2130
2 05560 92.7121 321.3196 0020452 45.9911 314.3015 14.41652014157746
AUREOLE 1 R/B
1 05730U 71119B 93325.78120026 .00002868 00000-0 25522-3 0 6150
2 05730 73.9230 138.3949 1000201 207.7118 146.7026 13.32045585 29775
COSMOS 476 R/B
1 05853U 72011B 93323.37441412 .00016860 00000-0 25247-3 0 3233
2 05853 81.1795 69.2189 0021202 249.7635 110.1062 15.54553188187554
WESTFORD NEEDLES
1 05994U 63014DA 93321.04272271 .00000002 00000-0 10000-3 0 9383
2 05994 87.4235 318.8317 0989278 75.0876 295.8999 8.28966274135591
COSMOS 482 DEB
1 06073U 72023E 93326.13587987 .00013024 00000-0 15800-3 0 8841
2 06073 52.1405 339.6088 3120418 336.5485 11.8617 9.25453313436445
OAO 3 (COPERNICUS)
1 06153U 72065A 93325.70116612 .00000115 00000-0 29900-4 0 6157
2 06153 35.0077 154.5368 0008553 326.0797 33.9348 14.52997751125857
OAO 3 R/B
1 06155U 72065B 93325.38492138 .00000261 00000-0 55155-4 0 2141
2 06155 35.0104 316.6297 0046830 201.9992 157.8718 14.59858988128024
1972-076A
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2 06212 98.5921 26.0031 0007679 326.1104 33.9677 14.77850363270452
AUREOLE 2 R/B
1 07004U 73107B 93324.51308698 .00002284 00000-0 15182-3 0 4193
2 07004 73.9741 350.5671 0693742 67.5909 299.7020 14.02514441984431
COSMOS 660 R/B
1 07338U 74044B 93324.67384067 .00003688 00000-0 23787-3 0 5173
2 07338 82.9578 327.2292 0614202 238.2163 115.7794 14.18809197966169
COSMOS 673 R/B
1 07418U 74066B 93325.69910398 .00006954 00000-0 18183-3 0 9190
2 07418 81.2222 57.1139 0020902 320.0091 39.9772 15.38356136 53403
COSMOS 744 R/B
1 07969U 75056B 93325.63551255 .00005343 00000-0 17208-3 0 9196
2 07969 81.2473 77.9372 0021319 242.2459 117.6847 15.31776593 6857
COS B R/B
1 08063U 75072B 93325.37450449 .00010124 00000-0 52661-3 0 5229
2 08063 89.2223 49.0374 1661857 332.7569 19.5211 12.05598520738500
COSMOS 807 R/B
1 08745U 76022B 93321.47571717 .00003888 00000-0 19948-3 0 5209
2 08745 82.9352 303.9188 0610123 114.5579 252.0473 14.25482304881577
METEOR 1-28 R/B
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1 10114U 77057B 93325.69310502 .00000011 00000-0 37829-5 0 8176
2 10114 97.9433 121.6388 0015972 75.2046 285.0809 14.95069042888445
COSMOS 925 R/B
1 10135U 77061B 93322.70249206 .00003636 00000-0 12563-3 0 6164
2 10135 81.2277 176.8738 0026253 120.9327 239.4565 15.29312425895393
COSMOS 955 R/B
1 10363U 77091B 93320.68008233 .00001623 00000-0 81703-4 0 3173
2 10363 81.2146 307.2740 0033021 180.3030 179.8199 15.16438356880523
SEASAT 1
1 10967U 78064A 93324.83273911 .00000110 00000-0 57516-4 0 2132
2 10967 108.0027 31.0248 0002836 259.6159 100.4674 14.37892148806415
COSMOS 1043
1 11055U 78094A 93324.76474454 .00009623 00000-0 21152-3 0 5239
2 11055 81.1693 204.9575 0003869 296.8885 63.2363 15.43852283827928
COSMOS 1043 R/B
1 11056U 78094B 93320.60168541 .00002712 00000-0 13509-3 0 2131
2 11056 81.1959 270.8338 0037613 304.9613 54.8214 15.16620211824266
COSMOS 1076 R/B
1 11267U 79011B 93325.64876546 .00000232 00000-0 27499-4 0 2134
2 11267 82.5301 36.6420 0017731 284.8104 75.1207 14.82348772797208
INTERCOSMOS 19
1 11285U 79020A 93323.77109862 .00002027 00000-0 13844-3 0 2161
2 11285 73.9717 76.7799 0185567 320.3157 38.4725 14.94030438788593
INTERCOSMOS 19 R/B
1 11286U 79020B 93324.63371759 .00001679 00000-0 11909-3 0 1154
2 11286 73.9735 100.5876 0199815 340.1894 19.1730 14.91046754787164
COSMOS 1151 R/B
1 11672U 80005B 93325.25203246 .00000267 00000-0 32519-4 0 8130
2 11672 82.5200 245.2325 0018381 328.7608 31.2525 14.81426464745884
COSMOS 1220
1 12054U 80089A 93324.52772837 .00001650 00000-0 21192-3 0 8718
2 12054 64.9980 3.1438 0169259 245.0842 113.2620 14.75129993616947
COSMOS 1238 R/B
1 12139U 81003B 93324.85414370 .00002608 00000-0 21129-3 0 3168
2 12139 82.9635 167.9899 0799835 41.4072 324.5050 13.74829375631333
COSMOS 1263 R/B
1 12389U 81033B 93325.48012503 .00003561 00000-0 22293-3 0 5210
2 12389 82.9513 317.4587 0757798 142.4756 223.2026 13.90242522622883
COSMOS 1400
1 13402U 82079A 93323.73937283 .00000959 00000-0 89504-4 0 6134
2 13402 81.1579 208.7798 0009009 260.6009 99.4416 14.93803697611017
IRAS
1 13777U 83004A 93321.17760256 -.00000017 00000-0 00000+0 0 5165
2 13777 98.9609 151.4693 0013005 174.0949 186.0541 13.99339741221481
COSMOS 1484 R/B
1 14208U 83075B 93323.54361636 .00000414 00000-0 48565-4 0 9139
2 14208 97.6127 323.0671 0034148 229.3752 130.4346 14.87087994558007
COSMOS 1500
1 14372U 83099A 93324.50772855 .00000575 00000-0 64922-4 0 5121
2 14372 82.5376 324.1276 0021237 40.7135 319.5683 14.85537130547312
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COSMOS 1508 R/B
1 14484U 83111B 93320.58638922 .00004015 00000-0 25199-3 0 2155
2 14484 82.9046 165.9563 0819923 17.1001 345.6148 13.77491957490781
COSMOS 1536
1 14699U 84013A 93325.81354414 .00000637 00000-0 76744-4 0 7139
2 14699 82.5383 239.4561 0020541 128.0090 232.3024 14.82955318527615
COSMOS 1544
1 14819U 84027A 93324.79280365 .00000676 00000-0 74606-4 0 7135
2 14819 82.5407 61.5357 0016394 223.4719 136.5246 14.86672316522515
COSMOS 1544 R/B
1 14820U 84027B 93323.36090369 .00000249 00000-0 32652-4 0 5131
2 14820 82.5462 76.4965 0019680 283.8139 76.0984 14.78219170521416
ERBS
1 15354U 84108B 93324.66269945 .00000145 00000-0 24127-4 0 9144
2 15354 56.9978 172.3167 0006221 62.6290 297.5294 14.94623787496342
COSMOS 1656 R/B(2)
1 15772U 85042D 93323.45545059 .00000126 00000-0 69283-4 0 3140
2 15772 71.1046 117.7817 0034343 92.8548 267.6659 14.19288543438807
COSMOS 1689
1 16110U 85090A 93325.82438680 .00002255 00000-0 12693-3 0 2173
2 16110 97.6141 45.4950 0034490 165.7692 194.4706 15.13799996444060
COSMOS 1689 R/B
1 16111U 85090B 93320.64404269 .00000078 00000-0 10000-4 0 7161
2 16111 97.5758 358.3843 0050140 260.6615 98.8958 14.93396361440519
COSMOS 1697 R/B
1 16182U 85097B 93325.80154915 -.00000246 00000-0 -11620-3 0 2149
2 16182 71.0016 105.4928 0009687 229.5050 130.5287 14.15202833417857
COSMOS 1726 R/B
1 16496U 86006B 93324.47769965 .00000285 00000-0 37266-4 0 4123
2 16496 82.5237 123.7421 0020612 297.1226 62.7893 14.78618605422598
MIR
1 16609U 86017A 93325.16142707 .00008225 00000-0 11149-3 0 5952
2 16609 51.6158 150.8308 0005117 11.2948 348.8115 15.58624840443592
SPOT 1 VIKING DEB
1 16615U 86019C 93324.73024272 .00000664 00000-0 24097-3 0 8137
2 16615 98.4575 29.4448 0021710 68.5604 291.7923 14.36231536403813
COSMOS 1766 R/B
1 16882U 86055B 93324.54114988 .00000234 00000-0 31102-4 0 3130
2 16882 82.5247 339.9582 0020301 225.1422 134.8180 14.77643133393940
COSMOS 1812
1 17295U 87003A 93325.43636357 .00000544 00000-0 62399-4 0 2158
2 17295 82.5301 113.5649 0018987 15.4884 344.6939 14.84886359369896
COSMOS 1833
1 17589U 87027A 93323.89963549 .00000147 00000-0 90700-4 0 1137
2 17589 70.8781 275.5608 0004590 320.6440 39.4363 14.12263680344320
COSMOS 1833 R/B
1 17590U 87027B 93325.78314921 .00000318 00000-0 18277-3 0 2132
2 17590 71.0044 263.4721 0002659 128.4940 231.6415 14.15662112345299
COSMOS 1844
1 17973U 87041A 93324.68875171 .00000267 00000-0 16540-3 0 1144
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2 17973 70.8969 41.5526 0001524 311.1619 48.9332 14.12766459336573
COSMOS 1844 R/B
1 17974U 87041B 93324.66505819 -.00000112 00000-0 -46508-4 0 1130
2 17974 71.0133 33.2375 0015967 216.9030 143.1098 14.16120837337335
COSMOS 1862 R/B
1 18153U 87055B 93324.76818554 .00000210 00000-0 27577-4 0 2132
2 18153 82.5046 234.6618 0022279 255.0125 104.8617 14.77835206344356
COSMOS 1867
1 18187U 87060A 93319.86230103 -.00000047 00000-0 -55778-6 0 1111
2 18187 65.0151 199.0200 0017641 281.7142 78.1954 14.30025123331686
COSMOS 1908 R/B
1 18749U 88001B 93324.72353977 .00000189 00000-0 24627-4 0 2132
2 18749 82.5186 59.8767 0022065 125.8963 234.4329 14.77808917316494
COSMOS 1933
1 18958U 88020A 93324.49283923 .00000499 00000-0 60437-4 0 8704
2 18958 82.5387 358.1279 0016935 324.0009 36.0060 14.82641235306744
IRS 1A R/B
1 18961U 88021B 93324.86130743 .00000214 00000-0 16599-3 0 2136
2 18961 98.7748 12.5795 0054658 304.0186 55.5787 14.00340768290246
COSMOS 1939
1 19045U 88032A 93322.45038807 .00001141 00000-0 11574-3 0 9756
2 19045 97.6973 17.3105 0022193 173.8618 186.2983 14.92620846302712
COSMOS 1939 R/B
1 19046U 88032B 93324.63832504 .00000411 00000-0 53953-4 0 3138
2 19046 97.7016 359.8524 0051004 127.0490 233.5505 14.81929621288689
COSMOS 1943 R/B
1 19120U 88039B 93323.54148540 -.00000220 00000-0 -97547-4 0 5158
2 19120 71.0123 136.7198 0021577 48.8404 311.4547 14.17710158285403
COSMOS 1954 R/B
1 19257U 88053B 93325.61080954 .00000098 00000-0 39662-4 0 1149
2 19257 74.0519 156.3244 0024155 241.4926 118.3782 14.33534545283372
COSMOS 1980 R/B
1 19650U 88102B 93323.80594201 -.00000045 00000-0 -12761-4 0 2141
2 19650 70.9964 108.0561 0015182 309.9240 50.0596 14.14843516257694
COSMOS 1985 DEB
1 19764U 88113H 93320.47521144 .00002146 00000-0 72007-4 0 2146
2 19764 73.5354 286.5973 0005272 105.4277 254.7522 15.31276515272451
INTERCOSMOS 24
1 20261U 89080A 93324.55682459 .00000195 00000-0 58619-4 0 2116
2 20261 82.5913 150.7759 1243609 17.8824 346.2203 12.47012945188776
INTERCOSMOS 24 R/B
1 20262U 89080C 93324.10536754 .00000160 00000-0 47271-4 0 2118
2 20262 82.5924 153.1635 1255159 26.2254 339.7219 12.44810519188575
COBE R/B
1 20323U 89089B 93323.83496255 .00000111 00000-0 36735-4 0 9133
2 20323 97.0923 106.8778 0079652 59.7398 301.1656 14.42763895210698
COSMOS 2053
1 20389U 89100A 93324.80363203 .00010906 00000-0 18687-3 0 8220
2 20389 73.5169 205.8513 0004457 174.6781 185.4861 15.51277250218169
COSMOS 2053 R/B
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1 20390U 89100B 93322.54419370 .00000939 00000-0 39075-4 0 2143
2 20390 73.5265 268.0075 0013041 221.3245 138.6857 15.24714792216133
SPOT 2 R/B
1 20443U 90005H 93325.70650228 .00000133 00000-0 56965-4 0 9137
2 20443 98.4787 35.9121 0011851 34.5250 325.6708 14.32062429200156
1990-008B
1 20453U 90008B 93325.65752820 .00002435 00000-0 26587-3 0 2165
2 20453 35.6353 86.4177 0526798 132.1665 232.5086 14.20582393197779
COSMOS 2058
1 20465U 90010A 93323.55630363 .00000420 00000-0 55793-4 0 3205
2 20465 82.4984 116.0285 0023947 66.2799 294.0917 14.78487149204990
COSMOS 2058 R/B
1 20466U 90010B 93324.83055905 .00000142 00000-0 18765-4 0 8126
2 20466 82.5023 117.6706 0024209 74.0020 286.3886 14.76245571205008
OKEAN 2 R/B
1 20511U 90018B 93324.66202103 .00000159 00000-0 21922-4 0 8138
2 20511 82.5284 22.0590 0019240 159.7869 200.4092 14.75061519200625
HST
1 20580U 90037B 93323.53056881 .00000748 00000-0 63169-4 0 3633
2 20580 28.4671 142.9646 0004413 232.0918 127.9350 14.92926079194745
COSMOS 2082 R/B
1 20625U 90046B 93320.78588854 -.00000171 00000-0 -80048-4 0 7122
2 20625 71.0053 214.3956 0016673 229.7725 130.1878 14.13660241180117
COSMOS 2084
1 20663U 90055A 93324.43185664 .00000454 00000-0 72425-4 0 8631
2 20663 62.8035 102.9922 0135130 147.0315 213.9281 14.73170243183473
COSMOS 2084 R/B(2)
1 20666U 90055D 93325.38982141 .00000559 00000-0 84688-4 0 9130
2 20666 62.7926 83.8298 0120721 153.3389 207.3967 14.75246204183907
COSMOS 2098 R/B
1 20775U 90078B 93322.56391718 .00003126 00000-0 24748-3 0 2166
2 20775 82.9625 134.6748 0966812 246.0635 103.6505 13.41455551157003
COSMOS 2106 R/B
1 20967U 90104B 93324.52379687 .00001195 00000-0 52782-4 0 8146
2 20967 82.5057 345.0691 0014338 112.8217 247.4705 15.21150839165053
INFORMATOR 1 R/B
1 21088U 91006B 93324.84525286 .00000013 00000-0 69971-5 0 7131
2 21088 82.9398 294.7324 0023425 286.6173 73.2407 13.76090048141142
COSMOS 2137
1 21190U 91021A 93325.66238951 .00023233 00000-0 21739-3 0 1314
2 21190 65.8296 61.1411 0001339 57.5752 302.5815 15.67232793151569
GRO
1 21225U 91027B 93323.10592449 .00016589 00000-0 17587-3 0 2235
2 21225 28.4613 251.4109 0075125 111.9850 248.8518 15.58788576 24490
OKEAN 3
1 21397U 91039A 93325.39112458 .00000321 00000-0 44851-4 0 9137
2 21397 82.5231 289.0473 0021115 214.7291 145.2578 14.76057507132857
OKEAN 3 R/B
1 21398U 91039B 93324.62308158 .00000167 00000-0 23151-4 0 6121
2 21398 82.5269 290.8801 0021684 222.0531 137.9026 14.74870238132661
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COSMOS 2151
1 21422U 91042A 93323.32118478 .00000436 00000-0 61935-4 0 2153
2 21422 82.5130 60.2605 0017626 274.1920 85.7269 14.75774162131150
COSMOS 2151 R/B
1 21423U 91042B 93324.72672601 .00000174 00000-0 24231-4 0 6131
2 21423 82.4995 57.8504 0017794 276.9680 82.9509 14.74941409131322
ERS-1
1 21574U 91050A 93323.92313764 .00000250 00000-0 10000-3 0 3321
2 21574 98.5417 36.4398 0001131 85.2171 274.8306 14.32250756122693
ERS-1 R/B
1 21610U 91050F 93320.69447379 .00000061 00000-0 28432-4 0 5122
2 21610 98.3654 22.8455 0004612 102.1866 257.9838 14.34538738122362
UARS
1 21701U 91063B 93320.80422262 -.00001889 00000-0 -15578-3 0 4142
2 21701 56.9838 290.0183 0005706 92.3355 267.8337 14.96177320119131
INTERCOSMOS 25
1 21819U 91086A 93324.53444846 .00001369 00000-0 28070-3 0 8127
2 21819 82.5611 122.6142 1609222 142.6336 229.8496 11.85835597 83318
INTERCOSMOS 25 R/B
1 21820U 91086B 93324.37487374 .00000620 00000-0 12365-3 0 5120
2 21820 82.5633 123.0186 1614255 143.9444 228.2231 11.84925437 83258
JERS-1
1 21867U 92007A 93324.23690483 .00002700 00000-0 22951-3 0 1339
2 21867 97.6665 37.9410 0002451 81.3073 278.6420 14.98689573 97086
JERS R/B
1 21868U 92007B 93324.63747204 .00026636 00000-0 47518-3 0 8380
2 21868 97.6807 74.5199 0044624 59.9779 300.6533 15.48916550 99490
COSMOS 2180 R/B
1 21876U 92008B 93324.69774177 .00000059 00000-0 56624-4 0 4134
2 21876 82.9293 30.5883 0033556 292.5259 67.2377 13.74286847 88145
COSMOS 2184 R/B
1 21938U 92020B 93323.84561294 .00000015 00000-0 96765-5 0 4141
2 21938 82.9286 268.7096 0030504 76.6293 283.8228 13.74270231 80150
COSMOS 2219
1 22219U 92076A 93324.92842051 .00000154 00000-0 10517-3 0 5816
2 22219 71.0224 170.4443 0008184 241.9779 118.0214 14.12215010 52042
COSMOS 2219 R/B
1 22220U 92076B 93323.66559476 .00000320 00000-0 18528-3 0 2120
2 22220 70.9981 168.3618 0011241 62.7878 297.4361 14.15182564 51975
COSMOS 2227 R/B
1 22285U 92093B 93324.78809245 .00000170 00000-0 11086-3 0 3144
2 22285 71.0188 257.6094 0006175 265.0845 94.9694 14.13855428 45111
COSMOS 2237 R/B
1 22566U 93016B 93324.50901807 -.00000343 00000-0 -17001-3 0 2134
2 22566 71.0081 123.8760 0012758 261.8775 98.0880 14.13866282 33848
COSMOS 2238
1 22585U 93018A 93325.90739799 .00000463 00000-0 10000-4 0 6106
2 22585 65.0251 323.7806 0009942 275.9275 83.9777 15.52042915 36681
COSMOS 2242
1 22626U 93024A 93323.24062409 .00000130 00000-0 18340-4 0 3182
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2 22626 82.5245 148.7469 0024231 314.4992 45.4196 14.73353455 31934
COSMOS 2244
1 22643U 93029A 93324.91935112 .00000463 00000-0 10000-4 0 4816
2 22643 65.0277 327.1180 0010270 274.8198 85.1347 15.52033256 32080
COSMOS 2258
1 22709U 93044A 93325.47887482 .00000463 00000-0 10000-4 0 4803
2 22709 65.0398 325.5960 0012732 297.2118 62.7527 15.52030136 21297
GOES 2
1 10061U 77048A 93325.52866128 .00000110 00000-0 10000-3 0 2195
2 10061 10.8115 48.2440 0002558 29.7310 36.8301 1.00268609 5031
GOES 3
1 10953U 78062A 93321.55729613 .00000117 00000-0 10000-3 0 2140
2 10953 9.7444 51.1580 0005087 90.2017 303.4537 1.00299095 9602
Nimbus 7
1 11080U 78098A 93324.70492899 .00000051 00000-0 61250-4 0 3180
2 11080 99.0759 210.7904 0008846 337.7247 22.3582 13.83724417761245
GOES 5
1 12472U 81049A 93315.19588281 .00000120 00000-0 10000-3 0 7064
2 12472 6.3726 60.5681 0003709 5.2428 279.4625 1.00235308 3570
GOES 6
1 14050U 83041A 93321.08009792 -.00000207 00000-0 10000-3 0 1142
2 14050 5.1708 63.3654 0001507 311.6098 351.5230 1.00246224 10653
NOAA 9
1 15427U 84123A 93321.67817478 .00000105 00000-0 66146-4 0 6128
2 15427 99.0821 4.3682 0015882 95.7490 264.5523 14.13562457460466
NOAA 10
1 16969U 86073A 93323.68554173 .00000096 00000-0 49118-4 0 5105
2 16969 98.5133 334.0643 0012433 218.5417 141.4895 14.24844816372776
GOES 7
1 17561U 87022A 93320.34338597 -.00000016 00000-0 10000-3 0 6201
2 17561 1.0823 78.3037 0002165 347.8486 0.9040 1.00266036 7833
DMSP B5D2-3
1 18123U 87053A 93326.23132276 .00000070 00000-0 45386-4 0 1288
2 18123 98.7891 155.9435 0015101 52.0534 308.1987 14.15318333331733
Meteor 2-16
1 18312U 87068A 93324.66270286 .00000103 00000-0 87483-4 0 2139
2 18312 82.5579 17.2448 0011982 344.7117 15.3724 13.84014293316217
Meteor 2-17
1 18820U 88005A 93324.77430959 .00000066 00000-0 53393-4 0 2122
2 18820 82.5425 74.3748 0017761 49.3727 310.8980 13.84697976293513
DMSP B5D2-4
1 18822U 88006A 93326.11826086 .00000161 00000-0 79999-4 0 2312
2 18822 98.4647 184.3514 0005519 226.7063 133.3657 14.22900062301078
METEOSAT 3
1 19215U 88051A 93325.88308743 -.00000224 00000-0 10000-3 0 8153
2 19215 1.2733 74.0671 0003612 220.3044 10.3236 1.00265644 7828
Meteor 3-2
1 19336U 88064A 93323.85953187 .00000043 00000-0 10000-3 0 2123
2 19336 82.5430 111.8147 0018125 66.9516 293.3281 13.16961716255707
NOAA 11
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1 19531U 88089A 93323.67891070 .00000156 00000-0 94238-4 0 4100
2 19531 99.1515 302.7055 0012244 5.6990 354.4307 14.12933644265630
Meteor 2-18
1 19851U 89018A 93320.51300057 .00000045 00000-0 35160-4 0 2124
2 19851 82.5191 313.4772 0015680 100.7230 259.5690 13.84349177238266
MOP-1
1 19876U 89020B 93320.12276759 .00000034 00000-0 10000-3 0 7131
2 19876 0.1331 327.1965 0002329 266.6775 226.3326 1.00290562 4990
GMS 4
1 20217U 89070A 93324.61164149 -.00000254 00000-0 10000-3 0 9197
2 20217 0.0756 82.0345 0000745 261.2706 76.7072 1.00266382 16008
Meteor 3-3
1 20305U 89086A 93322.67787330 .00000043 00000-0 10000-3 0 9149
2 20305 82.5604 55.8864 0018203 91.3654 269.0062 13.16024053195426
Meteor 2-19
1 20670U 90057A 93325.62861582 .00000015 00000-0 79036-5 0 7136
2 20670 82.5482 13.3392 0016493 14.8236 345.3422 13.84182354171904
Feng Yun1-2
1 20788U 90081A 93325.69890385 .00000280 00000-0 20817-3 0 8184
2 20788 98.8527 347.3415 0014034 231.3920 128.6001 14.01337309164645
Meteor 2-20
1 20826U 90086A 93325.46973098 .00000030 00000-0 21632-4 0 7123
2 20826 82.5229 311.2459 0011806 272.8085 87.1723 13.83564132159033
DMSP B5D2-5
1 20978U 90105A 93326.04896572 .00000257 00000-0 99702-4 0 3354
2 20978 98.7169 23.9435 0080225 53.9512 306.9071 14.32326044155440
MOP-2
1 21140U 91015B 93322.01034847 .00000018 00000-0 10000-3 0 6125
2 21140 0.3088 45.3242 0000995 308.9608 66.1865 1.00262966 4879
Meteor 3-4
1 21232U 91030A 93322.49437567 .00000043 00000-0 10000-3 0 6164
2 21232 82.5425 318.5515 0013147 0.9005 359.2404 13.16457524123636
NOAA 12
1 21263U 91032A 93323.56678881 .00000168 00000-0 84215-4 0 8176
2 21263 98.6421 350.7456 0013768 121.7860 238.4659 14.22334412130733
Meteor 3-5
1 21655U 91056A 93322.36429119 .00000043 00000-0 10000-3 0 6138
2 21655 82.5543 265.6198 0013589 7.0248 353.0891 13.16824655108719
DMSP B5D2-6
1 21798U 91082A 93326.22363155 .00000155 00000-0 91786-4 0 9869
2 21798 98.9589 326.6208 0013314 8.3332 351.8056 14.13734206102377
NOAA 13
1 22739U 93050A 93324.64986933 .00000139 00000-0 88021-4 0 2088
2 22739 98.9242 265.1274 0009933 355.1108 4.9940 14.10864184 14551
Meteor 2-21
1 22782U 93055A 93325.65877278 .00000101 00000-0 87052-4 0 2121
2 22782 82.5509 10.8972 0023907 87.2237 273.1663 13.82992586 11406
/EX
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368. Two-Line Orbital Element Set Format

Newsgroup: rec.radio.amateur.space
Date: 1993-11-26 23:05:27 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.754355127@afit.af.mil>
Source record: 28428
Cross-posted to: rec.radio.amateur.space,rec.radio.info

As a service to the satellite user community, the following description of the NORAD two-line orbital element set format is uploaded to sci.space.news and rec.radio.info on a monthly basis. The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity. In addition, element sets (also updated daily) and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

==========

Data for each satellite consists of three lines in the following format:

```
AAAAAAAAAAA
1 NNNNNU NNNNNAAA NNNNN.NNNNNNNN +.NNNNNNNN +NNNNN-N +NNNNN-N N NNNNN
2 NNNNN NNN.NNNN NNN.NNNN NNNNNNN NNN.NNNN NNN.NNNN NN.NNNNNNNNNNNNN
```

Line 0 is a eleven-character name.

Lines 1 and 2 are the standard Two-Line Orbital Element Set Format identical to that used by NORAD and NASA. The format description is:

```
Line 1
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
10-11 International Designator (Last two digits of launch year)
12-14 International Designator (Launch number of the year)
15-17 International Designator (Piece of launch)
19-20 Epoch Year (Last two digits of year)
21-32 Epoch (Julian Day and fractional portion of the day)
34-43 First Time Derivative of the Mean Motion
or Ballistic Coefficient (Depending on ephemeris type)
45-52 Second Time Derivative of Mean Motion (decimal point assumed;
blank if N/A)
54-61 BSTAR drag term if GP4 general perturbation theory was used.
Otherwise, radiation pressure coefficient. (Decimal point assumed)
63-63 Ephemeris type
65-68 Element number
69-69 Check Sum (Modulo 10)
(Letters, blanks, periods, plus signs = 0; minus signs = 1)
```

Line 2
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
09-16 Inclination [Degrees]
18-25 Right Ascension of the Ascending Node [Degrees]
27-33 Eccentricity (decimal point assumed)
35-42 Argument of Perigee [Degrees]
44-51 Mean Anomaly [Degrees]
53-63 Mean Motion [Revs per day]
64-68 Revolution number at epoch [Revs]
69-69 Check Sum (Modulo 10)

All other columns are blank or fixed.

Example:

NOAA 6
1 11416U 86 50.28438588 0.00000140 67960-4 0 5293
2 11416 98.5105 69.3305 0012788 63.2828 296.9658 14.24899292346978
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

369. Two-Line Orbital Element Sets (TLE300)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-26 23:08:13 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.754355293@afit.af.mil>
Source record: 28429
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #300 -
Alouette 1
1 00424U 62049 93329.84833505 .00000069 00000-0 77654-4 0 9159
2 00424 80.4640 125.6244 0022633 278.9208 80.9382 13.67788645554605
ATS 3
1 03029U 67111A 93321.53482604 -.00000081 00000-0 10000-3 0 1109
2 03029 14.5003 9.6434 0020712 241.4098 252.8976 1.00278883 95319
Cosmos 398
1 04966U 71016A 93329.57097641 .00106086 32230-4 26216-3 0 8056
2 04966 51.4595 22.3065 1225841 141.0464 228.5548 13.41468272744936
Starlette
1 07646U 75010A 93327.59903827 .00000005 00000-0 51862-4 0 7127
2 07646 49.8239 244.6335 0205794 17.2676 343.5129 13.82185039949406
LAGEOS
1 08820U 76039A 93328.59729539 -.00000002 00000-0 10000-3 0 9152
2 08820 109.8569 65.5081 0044098 328.9189 30.8852 6.38664617154089
ETS-2
1 09852U 77014A 93315.64518670 .00000115 00000-0 10000-3 0 9082
2 09852 11.7646 44.1098 0000417 69.1689 7.9235 1.00014189 8488
GOES 2
1 10061U 77048A 93325.52866128 .00000110 00000-0 10000-3 0 2195
2 10061 10.8115 48.2440 0002558 29.7310 36.8301 1.00268609 5031
IUE
1 10637U 78012A 93323.25215847 -.00000184 00000-0 10000-3 0 9155
2 10637 34.2591 98.3003 1301458 28.4954 332.1666 1.00270536 10619
GPS BI-01
1 10684U 78020A 93311.09083195 -.00000013 00000-0 10000-3 0 2068
2 10684 64.5250 52.1204 0063965 162.2632 197.9641 1.98069643100530
GPS BI-02
1 10893U 78047A 93322.46872453 -.00000016 00000-0 10000-3 0 2079
```

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2 10893 63.6507 291.1572 0209861 13.6317 346.9160 2.01627566113823
GOES 3
1 10953U 78062A 93321.55729613 .00000117 00000-0 10000-3 0 2140
2 10953 9.7444 51.1580 0005087 90.2017 303.4537 1.00299095 9602
SeaSat 1
1 10967U 78064A 93328.86778672 .00000061 00000-0 41299-4 0 2140
2 10967 108.0029 39.3763 0002947 258.7787 101.3036 14.37893105806999
GPS BI-03
1 11054U 78093A 93327.56837976 -.00000017 00000-0 10000-3 0 1112
2 11054 63.3520 287.8029 0043224 175.3967 184.6393 1.93505112110532
Nimbus 7
1 11080U 78098A 93329.69415197 .00000008 00000-0 22886-4 0 3194
2 11080 99.0751 215.6064 0008810 323.5300 36.5241 13.83724404761933
GPS BI-04
1 11141U 78112A 93327.54904045 -.00000019 00000-0 10000-3 0 8109
2 11141 64.7945 52.5890 0427415 12.3142 348.5200 1.81912022109031
GPS BI-05
1 11690U 80011A 93326.48393584 -.00000016 00000-0 10000-3 0 7118
2 11690 64.8744 53.5173 0142222 198.1177 161.4170 2.00552785115396
GPS BI-06
1 11783U 80032A 93327.05617827 -.00000016 00000-0 10000-3 0 9119
2 11783 62.7653 285.1393 0204315 30.1095 331.0481 2.03455482 99769
GOES 5
1 12472U 81049A 93315.19588281 .00000120 00000-0 10000-3 0 7064
2 12472 6.3726 60.5681 0003709 5.2428 279.4625 1.00235308 3570
Cosmos 1383
1 13301U 82066A 93327.88004868 .00000032 00000-0 30843-4 0 2143
2 13301 82.9313 100.2926 0026556 302.6405 57.2195 13.68046925569351
LandSat 4
1 13367U 82072A 93327.46638177 .00000167 00000-0 42203-4 0 3842
2 13367 98.2102 24.3909 0007075 165.1475 194.9956 14.57117907604093
IRAS
1 13777U 83004A 93326.54079425 .00000407 00000-0 30395-3 0 5180
2 13777 98.9736 156.7355 0012724 157.9941 202.1772 13.99190958222240
Cosmos 1447
1 13916U 83021A 93328.61269811 .00000035 00000-0 30594-4 0 3147
2 13916 82.9439 162.9977 0036614 239.0221 120.7354 13.74298223535238
TDRS 1
1 13969U 83026B 93329.40233309 .00000126 00000-0 10000-3 0 2229
2 13969 7.3041 53.2679 0000886 317.0844 27.9478 1.00272158 12002
GOES 6
1 14050U 83041A 93328.21168941 -.00000201 00000-0 10000-3 0 1151
2 14050 5.1835 63.3257 0002250 310.3771 46.5078 1.00244132 10728
OSCAR 10
1 14129U 83058B 93328.37358304 .00000006 00000-0 10000-3 0 2127
2 14129 27.1967 354.6814 6020029 132.8205 296.5509 2.05877703 50585
LandSat 5
1 14780U 84021A 93326.95592316 .00000022 00000-0 10000-4 0 9829
2 14780 98.1933 25.5043 0005115 166.9039 193.2351 14.57111984517446
UoSat 2
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1 14781U 84021B 93329.58852952 .00000248 00000-0 46105-4 0 6144
2 14781 97.7948 348.7516 0011121 196.5663 163.5164 14.69089775520417
GPS BI-09
1 15039U 84059A 93329.30548053 -.00000020 00000-0 10000-3 0 1177
2 15039 63.8475 47.4355 0055540 217.5299 142.1169 2.00561386 69252
Cosmos 1574
1 15055U 84062A 93328.74903899 .00000054 00000-0 51244-4 0 5142
2 15055 82.9593 215.7972 0028888 66.0452 294.3723 13.73595919472560
GPS BI-10
1 15271U 84097A 93329.23647884 -.00000018 00000-0 10000-3 0 7208
2 15271 62.4735 284.9821 0140697 345.8481 13.7433 2.00575111 66363
Cosmos 1602
1 15331U 84105A 93328.84426423 .00000608 00000-0 71070-4 0 2131
2 15331 82.5351 269.0168 0020603 152.9687 207.2580 14.84194566494201
NOAA 9
1 15427U 84123A 93339.44453018 .00000139 00000-0 84207-4 0 6134
2 15427 99.0789 22.3963 0015814 48.6545 311.6355 14.13568019462979
GPS BI-11
1 16129U 85093A 93325.48320644 -.00000017 00000-0 10000-3 0 5143
2 16129 64.5962 49.5901 0131657 141.7303 219.2381 2.00563677 5987
Mir
1 16609U 86017A 93329.00833400 .00005257 00000-0 70218-4 0 5984
2 16609 51.6175 131.5118 0004921 24.8845 335.1502 15.58670399444190
SPOT 1
1 16613U 86019A 93329.51090918 .00000114 00000-0 62356-4 0 5785
2 16613 98.7139 41.5688 0001111 92.7601 267.3690 14.20039735 87649
Cosmos 1766
1 16881U 86055A 93329.50750727 .00000481 00000-0 57279-4 0 1132
2 16881 82.5169 326.5045 0019264 173.3554 186.7936 14.83227714395266
EGP
1 16908U 86061A 93329.48237264 -.00000025 00000-0 10000-3 0 8134
2 16908 50.0124 350.6672 0011406 155.4505 204.6868 12.44408501331396
NOAA 10
1 16969U 86073A 93330.00562214 .00000495 00000-0 22795-3 0 5120
2 16969 98.5128 340.1933 0012983 198.4160 161.6592 14.24846767373676
MOS-1
1 17527U 87018A 93329.48922922 .00000134 00000-0 12493-3 0 9787
2 17527 99.0598 37.2135 0001310 93.3527 266.7785 13.94890663344538
GOES 7
1 17561U 87022A 93328.30988324 -.00000012 00000-0 10000-3 0 6211
2 17561 1.0995 78.2159 0002133 348.5569 355.9309 1.00267014 7919
Kvant-1
1 17845U 87030A 93329.00835075 .00008113 00000-0 10989-3 0 6425
2 17845 51.6160 131.5174 0005084 25.3034 334.8161 15.58669008444266
DMSP B5D2-3
1 18123U 87053A 93329.97815434 .00000001 00000-0 10000-4 0 1342
2 18123 98.7828 159.6348 0015216 41.8188 318.4144 14.15319069332260
RS-10/11
1 18129U 87054A 93325.49625370 .00000016 00000-0 10683-4 0 8137
2 18129 82.9207 122.3575 0010357 239.9809 120.0325 13.72326180321420
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Meteor 2-16
1 18312U 87068A 93329.65100409 .00000046 00000-0 36209-4 0 2149
2 18312 82.5573 13.2888 0011814 330.6454 29.4033 13.84014349316904
Meteor 2-17
1 18820U 88005A 93329.76014581 .00000068 00000-0 55353-4 0 2136
2 18820 82.5423 70.4092 0017640 35.6189 324.6118 13.84698624294200
DMSP B5D2-4
1 18822U 88006A 93329.98580741 .00001771 00000-0 80386-3 0 2370
2 18822 98.4639 188.0701 0005805 211.5967 148.4902 14.22903855301625
Glonass 34
1 19163U 88043A 93325.53794313 .00000024 00000-0 10000-3 0 8124
2 19163 64.9976 117.4118 0008108 169.7076 190.3253 2.13103128 42234
Glonass 36
1 19165U 88043C 93328.40932256 .00000024 00000-0 10000-3 0 2084
2 19165 64.9796 117.2986 0003778 335.2760 24.7126 2.13102202 42911
METEOSAT 3
1 19215U 88051A 93325.88308743 -.00000224 00000-0 10000-3 0 8153
2 19215 1.2733 74.0671 0003612 220.3044 10.3236 1.00265644 7828
AO-13
1 19216U 88051B 93324.87971886 -.00000221 00000-0 10000-4 0 8154
2 19216 57.8676 283.0185 7211074 328.8644 3.5221 2.09724867 10148
OKEAN 1
1 19274U 88056A 93329.78745731 .00000515 00000-0 63246-4 0 8139
2 19274 82.5140 65.9345 0019312 323.5527 36.4339 14.82014397290952
Meteor 3-2
1 19336U 88064A 93327.88606867 .00000043 00000-0 10000-3 0 2131
2 19336 82.5382 108.9623 0018510 57.6406 302.6575 13.16961911256238
Glonass 39
1 19503U 88085C 93323.27212437 -.00000017 00000-0 10000-3 0 1091
2 19503 65.7469 356.3992 0006133 176.2057 183.8479 2.13102194 40293
NOAA 11
1 19531U 88089A 93328.63587397 .00000095 00000-0 61349-4 0 4115
2 19531 99.1525 307.7712 0012011 352.1449 7.9563 14.12934262266336
TDRS 2
1 19548U 88091B 93326.58137962 -.00000253 00000-0 10000-3 0 8205
2 19548 0.5584 78.8292 0003101 148.1390 342.1501 1.00271273 6137
Glonass 40
1 19749U 89001A 93328.47389724 .00000023 00000-0 10000-3 0 3158
2 19749 64.9328 116.8963 0005178 263.6044 96.3407 2.13101678 37923
Glonass 41
1 19750U 89001B 93325.71520249 .00000024 00000-0 10000-3 0 2085
2 19750 64.9598 117.0392 0006823 249.0161 110.9043 2.13101846 37879
GPS BII-01
1 19802U 89013A 93329.31114637 .00000035 00000-0 10000-3 0 8141
2 19802 55.0782 147.8014 0035643 173.3617 186.7271 2.00568502 34954
Akebono
1 19822U 89016A 93326.70615543 .00010494 00000-0 62955-3 0 1316
2 19822 75.0893 298.4933 3844322 81.7887 319.1313 7.72608089 93278
Meteor 2-18
1 19851U 89018A 93320.51300057 .00000045 00000-0 35160-4 0 2124
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2 19851 82.5191 313.4772 0015680 100.7230 259.5690 13.84349177238266
MOP-1
1 19876U 89020B 93320.12276759 .00000034 00000-0 10000-3 0 7131
2 19876 0.1331 327.1965 0002329 266.6775 226.3326 1.00290562 4990
TDRS 3
1 19883U 89021B 93325.77356142 -.00000236 00000-0 00000+0 0 8165
2 19883 0.0905 68.4921 0004811 250.0604 339.6688 1.00267514 87381
GPS BII-02
1 20061U 89044A 93328.15656647 -.00000026 00000-0 10000-3 0 8182
2 20061 54.7480 324.8034 0125532 205.1298 154.2667 2.00566140 32682
Nadezhda 1
1 20103U 89050A 93328.79341777 .00000035 00000-0 30319-4 0 9154
2 20103 82.9599 78.4956 0038392 137.4299 222.9816 13.73828910220241
GPS BII-03
1 20185U 89064A 93325.99889802 .00000032 00000-0 10000-3 0 8187
2 20185 54.9129 148.5787 0006020 228.5240 131.4605 2.00552520 31206
GMS 4
1 20217U 89070A 93327.27053656 -.00000252 00000-0 10000-3 0 9202
2 20217 0.0890 87.2565 0001003 265.7621 306.7489 1.00264944 16023
GPS BII-04
1 20302U 89085A 93329.02319480 -.00000019 00000-0 10000-3 0 8185
2 20302 53.6988 265.2476 0006920 297.1076 62.8686 2.00561749 30068
Meteor 3-3
1 20305U 89086A 93326.70726297 .00000043 00000-0 10000-3 0 9153
2 20305 82.5547 53.0394 0017057 80.9974 279.2674 13.16023734195950
COBE
1 20322U 89089A 93325.59839986 .00000228 00000-0 16803-3 0 9120
2 20322 98.9869 339.3661 0009339 125.4443 234.7457 14.03426038205266
Kvant-2
1 20335U 89093A 93329.00835075 .00008113 00000-0 10989-3 0 7380
2 20335 51.6160 131.5174 0005084 25.3034 334.8161 15.58669008444219
GPS BII-05
1 20361U 89097A 93328.53067732 -.00000001 00000-0 10000-3 0 7155
2 20361 55.4145 90.4319 0071939 103.3707 257.4186 2.00567079 19542
SPOT 2
1 20436U 90005A 93327.50635378 .00000120 00000-0 65161-4 0 6836
2 20436 98.6908 39.8629 0001651 83.3567 276.7780 14.20043770198899
UO-14
1 20437U 90005B 93329.65790977 .00000093 00000-0 43895-4 0 9148
2 20437 98.6035 52.0806 0011930 69.3207 290.9251 14.29805964200504
UO-15
1 20438U 90005C 93329.21991557 .00000049 00000-0 27291-4 0 7149
2 20438 98.6048 50.8407 0011008 72.6147 287.6231 14.29151912200371
PACSAT
1 20439U 90005D 93329.65139180 .00000078 00000-0 38188-4 0 7143
2 20439 98.6116 53.1033 0012281 69.9146 290.3351 14.29862845200515
DO-17
1 20440U 90005E 93329.69541395 .00000081 00000-0 39082-4 0 7142
2 20440 98.6133 53.4054 0012278 69.3547 290.8917 14.30000149200535
WO-18
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1 20441U 90005F 93329.66728536 .00000066 00000-0 33235-4 0 7152
2 20441 98.6131 53.3931 0012865 69.5507 290.7020 14.29977633200530
LO-19
1 20442U 90005G 93325.67080327 .00000099 00000-0 46017-4 0 7135
2 20442 98.6146 49.6483 0013250 80.8874 279.3806 14.30069500199976
GPS BII-06
1 20452U 90008A 93325.44703114 .00000014 00000-0 10000-3 0 8174
2 20452 54.0801 204.9745 0053490 70.4997 290.2580 2.00565618 27975
MOS-1B
1 20478U 90013A 93329.24748171 .00000117 00000-0 10000-3 0 5218
2 20478 99.0610 41.0967 0000692 95.9150 264.2085 13.94904147114219
DEBUT
1 20479U 90013B 93325.54755461 .00000017 00000-0 64564-4 0 7102
2 20479 99.0186 151.9021 0540969 89.8022 276.5064 12.83310335177507
FO-20
1 20480U 90013C 93325.97912877 -.00000005 00000-0 14514-4 0 6104
2 20480 99.0202 152.1718 0541163 89.0188 277.2925 12.83222068177550
MOS-1B R/B
1 20491U 90013D 93327.66445426 -.00000434 00000-0 -78970-3 0 9155
2 20491 99.0376 192.7812 0470314 329.5760 27.8697 13.02983958179894
LACE
1 20496U 90015A 93327.34922219 .00003172 00000-0 11025-3 0 3171
2 20496 43.0993 137.9638 0011635 116.9119 243.3737 15.31689324209936
Nadezhda 2
1 20508U 90017A 93328.68028995 .00000042 00000-0 37864-4 0 9149
2 20508 82.9562 213.2432 0045981 89.0463 271.5927 13.73463675187478
OKEAN 2
1 20510U 90018A 93329.64487400 .00000347 00000-0 46144-4 0 2142
2 20510 82.5243 13.8646 0020191 131.5852 228.7113 14.78186764201593
INTELSAT-6
1 20523U 90021A 93328.34868552 -.00000209 00000-0 20000-3 0 3171
2 20523 0.0248 302.2022 0000252 217.3502 354.7648 1.00268511 6555
GPS BII-07
1 20533U 90025A 93327.34865371 -.00000026 00000-0 10000-3 0 8150
2 20533 55.0849 325.2997 0040258 83.9653 276.5154 2.00564220 26780
PegSat
1 20546U 90028A 93327.86704969 .00006641 00000-0 17377-3 0 5237
2 20546 94.1141 182.7448 0081035 0.4382 359.6423 15.35446623200718
HST
1 20580U 90037B 93326.53889941 .00000818 00000-0 69765-4 0 3644
2 20580 28.4673 123.5668 0004218 266.1154 93.8990 14.92930899195195
MACSAT 2
1 20608U 90043B 93325.64495529 .00000290 00000-0 48681-4 0 9136
2 20608 89.9210 181.4469 0108658 95.9466 265.4138 14.64592162188902
Glonass 44
1 20619U 90045A 93327.43568741 -.00000016 00000-0 00000+0 0 9388
2 20619 65.3410 355.9603 0025933 215.3796 144.5034 2.13102785 27363
Glonass 45
1 20620U 90045B 93328.49274049 -.00000015 00000-0 00000+0 0 9303
2 20620 65.3413 355.9209 0003897 43.8576 316.2507 2.13102912 27393
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Glonass 46
1 20621U 90045C 93328.08725023 -.00000016 00000-0 10000-3 0 6158
2 20621 65.3239 355.9768 0014431 199.8811 160.1027 2.13100410 27394
Kristall
1 20635U 90048A 93329.00835075 .00008113 00000-0 10989-3 0 5350
2 20635 51.6160 131.5174 0005084 25.3034 334.8161 15.58669008444212
ROSAT
1 20638U 90049A 93328.63311520 .00000356 00000-0 33396-4 0 2172
2 20638 52.9858 189.9002 0012853 161.2640 198.8161 15.06492684191231
Meteor 2-19
1 20670U 90057A 93325.62861582 .00000015 00000-0 79036-5 0 7136
2 20670 82.5482 13.3392 0016493 14.8236 345.3422 13.84182354171904
CRRES
1 20712U 90065A 93328.91381054 .00000717 00000-0 72392-3 0 7795
2 20712 17.8562 272.2223 7195339 34.7957 355.7717 2.34849583 21076
GPS BII-08
1 20724U 90068A 93327.16634959 .00000032 00000-0 10000-3 0 7150
2 20724 54.7155 146.2480 0108636 155.2598 205.3043 2.00562686 24208
Feng Yun1-2
1 20788U 90081A 93328.48349679 .00000252 00000-0 18963-3 0 8200
2 20788 98.8532 350.0422 0014012 223.1985 136.8069 14.01338587165034
Meteor 2-20
1 20826U 90086A 93325.46973098 .00000030 00000-0 21632-4 0 7123
2 20826 82.5229 311.2459 0011806 272.8085 87.1723 13.83564132159033
GPS BII-09
1 20830U 90088A 93329.21192080 -.00000004 00000-0 10000-3 0 7152
2 20830 55.3479 88.4557 0068645 107.0819 253.6515 2.00556651 23327
GPS BIIA-10
1 20959U 90103A 93327.12576115 .00000033 00000-0 10000-3 0 6155
2 20959 54.9436 148.1175 0077078 222.3348 137.1202 2.00571813 21879
DMSP B5D2-5
1 20978U 90105A 93328.63363305 .00000255 00000-0 98898-4 0 3403
2 20978 98.7162 26.5401 0080194 46.4108 314.3689 14.32327464155825
Glonass 47
1 21006U 90110A 93327.17998930 .00000024 00000-0 00000+0 0 5452
2 21006 64.9171 116.3177 0060413 185.9942 173.9358 2.13102789 23045
Glonass 48
1 21007U 90110B 93328.30289378 .00000023 00000-0 00000+0 0 6346
2 21007 64.9271 116.3317 0037656 177.6508 182.3571 2.13101054 23070
Glonass 49
1 21008U 90110C 93328.65815115 .00000023 00000-0 00000+0 0 6349
2 21008 64.9177 116.2814 0007738 280.4946 79.3707 2.13099186 23050
INFORMTR-1
1 21087U 91006A 93327.46610100 .00000084 00000-0 82657-4 0 3703
2 21087 82.9432 294.9482 0034102 299.3528 60.4149 13.74528481141311
Cosmos 2123
1 21089U 91007A 93327.59616256 .00000030 00000-0 25224-4 0 6147
2 21089 82.9217 163.9135 0028927 323.6427 36.2770 13.74030145140417
MOP-2
1 21140U 91015B 93329.39213764 .00000019 00000-0 10000-3 0 6132
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2 21140 0.3281 47.1726 0000962 283.4177 234.2704 1.00262199 4949
Nadezhda 3
1 21152U 91019A 93329.39003114 .00000055 00000-0 52538-4 0 7139
2 21152 82.9242 118.1627 0043177 63.1241 297.4321 13.73490890135400
Glonass 50
1 21216U 91025A 93329.07500218 -.00000015 00000-0 10000-3 0 2105
2 21216 65.0934 355.7407 0011604 214.4943 145.4918 2.13103566 20596
Glonass 51
1 21217U 91025B 93327.26239628 -.00000017 00000-0 10000-3 0 5340
2 21217 65.0820 355.8138 0012779 236.6638 123.2690 2.13101592 20547
Glonass 52
1 21218U 91025C 93318.46172122 -.00000016 00000-0 10000-3 0 1107
2 21218 65.1095 356.0896 0013044 277.9408 81.9941 2.13099064 20365
GRO
1 21225U 91027B 93324.00000000 .00014572 00000-0 17587-3 0 2243
2 21225 28.4755 245.0259 0065766 108.2735 237.6037 15.56285369 24495
Meteor 3-4
1 21232U 91030A 93329.48649054 .00000043 00000-0 10000-3 0 6188
2 21232 82.5434 313.6062 0013028 340.5816 19.4343 13.16456336124559
NOAA 12
1 21263U 91032A 93328.56140800 .00000165 00000-0 82860-4 0 8188
2 21263 98.6419 355.6415 0013857 107.9429 252.3262 14.22336336131446
OKEAN 3
1 21397U 91039A 93329.59408650 .00000292 00000-0 40670-4 0 9148
2 21397 82.5255 285.1577 0021779 199.7155 160.3204 14.76059572133468
GPS BIIA-11
1 21552U 91047A 93328.89256146 -.00000005 00000-0 10000-3 0 6191
2 21552 55.6606 85.9987 0053045 232.0301 127.4780 2.00571788 17509
ERS-1
1 21574U 91050A 93328.46406542 .00000143 00000-0 60431-4 0 3349
2 21574 98.5408 40.9107 0001111 80.1490 279.9797 14.32251596123343
UO-22
1 21575U 91050B 93329.66348198 .00000110 00000-0 43938-4 0 4141
2 21575 98.4552 43.0587 0007468 171.3856 188.7451 14.36867889123851
ORBCOMM-X
1 21576U 91050C 93328.81686269 .00000147 00000-0 57390-4 0 5140
2 21576 98.4559 41.2863 0003542 175.2546 184.8678 14.36255051123674
TUBSAT
1 21577U 91050D 93329.69710073 .00000074 00000-0 32172-4 0 4148
2 21577 98.4557 42.5444 0006071 169.7480 190.3804 14.36405840123820
SARA
1 21578U 91050E 93329.67810366 .00000496 00000-0 17541-3 0 6145
2 21578 98.4648 44.8557 0004926 171.8978 188.2258 14.38591833123947
TDRS 4
1 21639U 91054B 93322.40819233 .00000114 00000-0 00000+0 0 6205
2 21639 0.0398 15.9113 0000789 202.8845 171.4268 1.00277184 6472
Meteor 3-5
1 21655U 91056A 93327.30300481 .00000043 00000-0 10000-3 0 6148
2 21655 82.5541 262.1324 0013850 356.1728 3.9270 13.16825241109368
UARS
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1 21701U 91063B 93327.35214307 -.00001664 00000-0 -13600-3 0 4154
2 21701 56.9835 263.7915 0005840 94.0654 266.1542 14.96158019120112
DMSP B5D2-6
1 21798U 91082A 93328.48839670 .00000123 00000-0 74925-4 0 9916
2 21798 98.9598 328.8905 0013226 2.1456 357.9789 14.13734590102697
Glonass 53
1 21853U 92005A 93328.52896742 .00000023 00000-0 10000-3 0 8137
2 21853 64.8475 115.9972 0006929 193.5502 166.4293 2.13102400 14188
Glonass 54
1 21854U 92005B 93328.82175469 .00000022 00000-0 00000+0 0 8388
2 21854 64.8574 115.9733 0016294 16.4248 343.6159 2.13103138 14178
Glonass 55
1 21855U 92005C 93328.41278434 .00000023 00000-0 00000+0 0 8303
2 21855 64.8621 115.9969 0007363 193.1421 166.8177 2.13102217 14156
JERS-1
1 21867U 92007A 93328.77711307 .00001089 00000-0 93074-4 0 1357
2 21867 97.6660 42.4030 0001959 75.4394 284.7384 14.98678979 97762
GPS BIIA-12
1 21890U 92009A 93328.35156684 -.00000019 00000-0 10000-3 0 4151
2 21890 54.2540 265.1910 0056642 159.8754 200.3515 2.00559908 12869
GPS BIIA-13
1 21930U 92019A 93327.06663126 -.00000028 00000-0 10000-3 0 4169
2 21930 55.5092 26.0894 0047489 174.8373 185.2519 2.00562949 11771
EUVE
1 21987U 92031A 93329.43766185 .00001715 00000-0 77600-4 0 2157
2 21987 28.4348 340.3814 0010460 268.8158 91.1170 15.17824142 81395
SAMPEX
1 22012U 92038A 93325.65995371 .00001874 00000-0 15998-3 0 4187
2 22012 81.6759 29.3198 0118427 355.8093 4.2086 14.91848769 75383
GPS BIIA-14
1 22014U 92039A 93328.59777439 .00000017 00000-0 10000-3 0 3152
2 22014 54.9230 205.8899 0082680 294.2294 64.9932 2.00571927 3640
Glonass 56
1 22056U 92047A 93329.25223897 -.00000015 00000-0 00000+0 0 7344
2 22056 64.9281 355.9693 0006480 265.5906 94.3875 2.13103021 10266
Glonass 57
1 22057U 92047B 93328.13819564 -.00000016 00000-0 00000+0 0 7366
2 22057 64.9367 356.0233 0009025 305.7489 54.2294 2.13102714 10230
Glonass 58
1 22058U 92047C 93329.48706511 -.00000015 00000-0 00000+0 0 7384
2 22058 64.9377 355.9937 0012734 274.8834 85.0293 2.13103318 10290
TOPEX
1 22076U 92052A 93328.48055315 -.00000001 00000-0 10000-3 0 6703
2 22076 66.0434 356.1985 0007941 265.0943 94.9161 12.80930573 60272
KITSAT-A
1 22077U 92052B 93325.56659606 .00000000 00000-0 10000-3 0 3102
2 22077 66.0893 354.6876 0005267 339.3077 20.7715 12.86281948 60088
S80/T
1 22078U 92052C 93325.54228603 .00000000 00000-0 10000-3 0 3100
2 22078 66.0900 354.2436 0006347 348.8906 11.1962 12.86563546 60144
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TOPEX R/B
1 22079U 92052D 93320.65318160 -.00000002 00000-0 10000-3 0 3097
2 22079 66.0743 19.3391 0075426 291.9279 67.3722 12.77663266 59194
GPS BIIA-15
1 22108U 92058A 93328.06275421 -.00000019 00000-0 10000-3 0 3156
2 22108 54.4701 265.8611 0104837 132.8934 227.9897 2.00569065 8801
FREJA
1 22161U 92064A 93327.43355939 .00000031 00000-0 37192-4 0 3149
2 22161 63.0071 93.1167 0774325 296.9538 55.4434 13.21684783 54599
LAGEOS II
1 22195U 92070B 93329.40264011 -.00000004 00000-0 10000-3 0 2140
2 22195 52.6485 222.4850 0137850 28.5873 332.2148 6.47293942 25748
GPS BIIA-16
1 22231U 92079A 93327.25170017 .00000014 00000-0 10000-3 0 3177
2 22231 54.7871 207.2375 0040283 293.8939 65.7416 2.00566255 7366
GPS BIIA-17
1 22275U 92089A 93326.89328017 .00000015 00000-0 10000-3 0 3171
2 22275 54.6906 204.7678 0052980 256.4268 103.1169 2.00556351 6768
TDRS 5
1 22314U 93003B 93327.50363351 -.00000219 00000-0 10000-3 0 3167
2 22314 0.6470 72.3757 0003530 210.2637 274.6258 1.00543554 3266
GPS BIIA-18
1 22446U 93007A 93328.46576577 -.00000026 00000-0 10000-3 0 3143
2 22446 54.7625 325.6753 0069420 336.9977 22.6948 2.00552682 5832
Glonass 59
1 22512U 93010A 93328.52949732 .00000023 00000-0 00000+0 0 4349
2 22512 64.8811 115.8444 0009367 188.9886 170.9946 2.13102081 5764
Glonass 60
1 22513U 93010B 93329.40872544 .00000022 00000-0 00000+0 0 4466
2 22513 64.8686 115.8206 0007138 182.2564 177.7366 2.13102786 5971
Glonass 61
1 22514U 93010C 93327.29771440 .00000023 00000-0 00000+0 0 4309
2 22514 64.8818 115.8784 0014161 184.1168 175.8678 2.13101874 5922
ASTRO-D
1 22521U 93011A 93325.30070055 .00001242 00000-0 10332-3 0 2138
2 22521 31.1049 301.2194 0076913 222.2565 137.2199 14.92714281 40995
UHF F1
1 22563U 93015A 93326.56947811 -.00000156 00000-0 10000-3 0 2079
2 22563 27.0068 302.7968 0007859 265.8703 5.4591 0.99251149 6783
GPS BIIA-19
1 22581U 93017A 93328.11234918 -.00000029 00000-0 10000-3 0 2182
2 22581 55.0118 25.8861 0041409 33.2100 327.0893 2.00575313 4841
ProgressM17
1 22588U 93019A 93328.50263751 .00015586 00000-0 13863-3 0 3567
2 22588 51.6175 128.1151 0003073 19.6307 340.4443 15.68704529 37188
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
GPS BIIA-20
1 22657U 93 32 A 93293.34104706 -.00000026 00000-0 99999-4 0 2058
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2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21
1 22700U 93042A 93329.70656335 -.00000019 00000-0 10000-3 0 2145
2 22700 54.6504 266.4946 0025926 306.2961 53.4644 2.00570779 3001
Soyuz TM-17
1 22704U 93043A 93329.00835155 .00008113 00000-0 10989-3 0 2364
2 22704 51.6160 131.5174 0005084 25.3034 334.8206 15.58669008444211
NOAA 13
1 22739U 93050A 93339.47171040 -.00000015 00000-0 20836-5 0 2108
2 22739 98.9259 279.8506 0009442 312.2291 47.9102 14.10865880 16644
GPS BIIA-22
1 22779U 93054A 93329.29400957 -.00000026 00000-0 10000-3 0 2222
2 22779 54.8884 325.5346 0027262 229.2113 130.5540 2.00556799 1746
Meteor 2-21
1 22782U 93055A 93325.65877278 .00000101 00000-0 87052-4 0 2121
2 22782 82.5509 10.8972 0023907 87.2237 273.1663 13.82992586 11406
SPOT 3
1 22823U 93061A 93325.71505707 .00000194 00000-0 10000-3 0 2193
2 22823 98.7384 38.1146 0000958 80.7776 279.3479 14.20026835 8031
STELLA
1 22824U 93061B 93325.65817305 .00000046 00000-0 26930-4 0 2126
2 22824 98.6793 38.3198 0007357 91.9522 268.2544 14.27094113 8072
KO-25
1 22825U 93061C 93325.63865674 .00000077 00000-0 39483-4 0 2128
2 22825 98.6761 38.3168 0009527 93.6148 266.6130 14.27591127 8079
POSAT-1
1 22826U 93061D 93325.63461159 .00000078 00000-0 39608-4 0 2130
2 22826 98.6764 38.3197 0010035 94.7836 265.4492 14.27693538 8074
HEATHSAT
1 22827U 93061E 93325.63062458 .00000131 00000-0 60982-4 0 2757
2 22827 98.6738 38.3070 0010219 83.4992 276.7343 14.27794239 8078
ITAMSAT
1 22828U 93061F 93326.61170949 .00000061 00000-0 32635-4 0 2129
2 22828 98.6738 39.2798 0010455 80.2690 279.9381 14.27794111 8210
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93329.75587440 .00000078 00000-0 39496-4 0 2140
2 22830 98.5755 41.8168 0012580 55.8337 304.4036 14.28018454 8668
ProgressM20
1 22867U 93064A 93325.09506298 -.00000264 00000-0 00000+0 0 249
2 22867 51.6279 151.1396 0009457 79.4698 280.9942 15.60141603443586
1993 067A
1 22875U 93067A 93328.70129199 .00016125 00000-0 34576-3 0 277
2 22875 82.9406 235.5081 0873837 28.0418 336.5216 13.89590786 336
GPS BIIA-23
1 22877U 93068A 93327.35133351 -.00000003 00000-0 10000-3 0 157
2 22877 55.0736 86.7129 0029173 280.4156 79.2217 2.00560519 595
1993 068B
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1 22878U 93068B 93328.10561505 .00006156 00000-0 23162-3 0 144
2 22878 35.1522 245.9200 0057602 59.2426 301.3741 15.24923106 4328
Gorizont 28
1 22880U 93069A 93327.34689051 -.00000204 00000-0 00000+0 0 231
2 22880 1.4113 276.3326 0004600 287.6382 73.4351 1.00278663 272
1993 069D
1 22883U 93069D 93327.29628883 -.00000331 00000-0 00000+0 0 22
2 22883 1.4600 279.5949 0005113 310.8696 49.5934 1.00492222 279
1993 069E
1 22884U 93069E 93324.95658819 .00003662 00000-0 91178-3 0 114
2 22884 47.3294 268.9461 7285588 6.0662 359.2843 2.27872799 540
1993 069F
1 22885U 93069F 93325.88065108 .00001364 00000-0 98831-3 0 98
2 22885 47.3769 268.8193 7265924 6.1976 359.2088 2.27383043 573
Cosmos 2266
1 22888U 93070A 93327.60745577 .00000024 00000-0 19076-4 0 154
2 22888 82.9530 236.8694 0046898 235.3423 120.5616 13.74205182 174
1993 070B
1 22889U 93070B 93325.90449551 .00001304 00000-0 13123-2 0 189
2 22889 82.9461 238.0707 0045161 216.9286 140.9058 13.76507807 2686
Cosmos 2267
1 22904U 93071A 93329.24210181 .00129442 94233-5 22614-3 0 416
2 22904 70.3862 156.3670 0038951 135.4871 224.6251 16.00501837 3194
1993 066B
1 22906U 93066B 93329.39096067 .00079143 44022-5 12533-2 0 199
2 22906 6.9583 291.3684 7335107 206.9438 82.6363 2.26242005 374
1993 072A
1 22907U 93072A 93328.63191333 -.00000243 00000-0 00000+0 0 52
2 22907 1.4933 277.9403 0037846 60.5324 84.5536 1.00536466 60
1993 072B
1 22908U 93072B 93325.07576168 .13461502 61671-4 15488-3 0 126
2 22908 51.6548 261.8270 0005037 307.4261 52.7459 16.49846120 414
1993 072D
1 22910U 93072D 93326.69464345 -.00000037 00000-0 10000-3 0 74
2 22910 1.4974 277.8373 0014824 15.0081 151.4124 1.03165940 43
1993 073A
1 22911U 93073A 93329.30747106 -.00000102 00000-0 00000+0 0 142
2 22911 0.1409 269.7652 0164691 178.6464 331.9955 1.02864111 123
1993 073B
1 22912U 93073B 93326.65743543 -.00000043 00000-0 00000+0 0 75
2 22912 1.2187 281.9234 0010287 20.8259 338.4078 1.00525388 61
1993 073C
1 22913U 93073C 93326.11247928 .00326987 97823-5 26969-1 0 56
2 22913 6.7382 255.1865 7360381 178.5585 186.4148 2.20843869 53
1993 073D
1 22914U 93073D 93326.48003462 .00061301 00000-0 79166-2 0 61
2 22914 6.9342 253.6283 7296032 179.8727 181.0422 2.28007848 44
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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370. Re: Satellites and Frequencys

Newsgroup: rec.radio.amateur.space
Date: 1993-11-28 04:10:39 UTC
From: cbr600@abc.ksu.ksu.edu
Message-ID: <2d98bvINNc8f@abc.ksu.ksu.edu>
Source record: 28430

In article <CH09r4.n46@microsoft.com> laurahal@microsoft.com (Laura Halliday) writes:
>
>Shameless plug: you can get all this information and lots more
>from AMSAT. Including useful introductory materials, a way cool
>journal, and lots more.
>
>73,
>laura VE7LDH

Unfortunately, I wasn't plugging anything. Just providing information to some
of the others who are new to Ham Radio.

73 de N0YAX
-. ----- -.-- .- -..- ...-.-
cbr600@matt.ksu.ksu.edu (Internet)
cbr600@ksuvm (Bitnet)
BXTH85A (Prodigy)
n0yax@n0oer.#neks.ks.usa.na (Packet Radio)
--- Standard Disclaimers Apply ---

371. Re: MIR Packet frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-28 09:52:02 UTC
From: jmorris@mu.apana.org.au
Message-ID: <754480322.15snx@mu.apana.org.au>
Source record: 28431

In article <96562@cup.portal.com> Larry_L_Ledlow@cup.portal.com writes:

>This usualy happens Friday/Saturday nights when they have some spare time.

Friday/Saturday nights.. in which time zone ?

JM.

--
jmorris@mu.apana.org.au
James Morris VK2GVA

372. ANS-331 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-11-28 18:12:40 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-331.01.1993@ampr.org>
Source record: 28432
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-331.01
MICROSAT ANTENNA POLARIZATION

HR AMSAT NEWS SERVICE BULLETIN 331.01 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 27, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-331.01

WD0E Explains MICROSAT Antenna Polarization

There have been quite a few question raised recently regarding the sense of polarization of the MICROSATs. Jim White (WD0E) sheds some light on the subject with the following: "There has been a certain amount of confusion about the sense of the polarization of the MICROSAT down links. The following is an attempt to clarify it. The two transmitters in each MICROSAT are connected to the canted turnstile downlink antenna through a hybrid. The two input ports they are connected to are out of phase with each other. So when one transmitter is on the sense of the downlink will be RHCP and when the other is on it will be LHCP. When we switch trans-mitters, we also switch polarization sense. No sense is 'normal'. During construction there was no attempt to make a particular transmitter a particular sense. The limiting factor was how to fit the semi-rigid cables connecting all the various parts together in the tiny space inside the transmitter module. Additionally, since one of the objectives of the MICROSAT Project was to create satellites that could be used with very simple portable ground stations using simple omni-directional antennas, there was no need to be concerned about sense. When receiving with a circularly polarized ground antennas, miss-matched sense can make several dB of difference at times. The most strongly circular signal will be received by the ground station when the bottom of the satellite is pointed directly at it. For stations at about 35 to 50 degrees north or south latitude, this happens when the satellites are directly overhead and slightly lower in latitude. (For all but LO-19 the turnstile is pointed down in the northern hemisphere, for LO-19 it's down in the southern hemisphere). At other times the sense is effected by a variety of other influences and cannot be relied on. If you have a circularly polarized Yagi with swit-chable sense you can do a test yourself to see which transmitter provides which sense. Throughout a pass, but particularly when the satellite is nearly overhead, switch the antenna sense every few seconds and see which is stronger. At times you will notice a large difference (AO-16 is 5 S units different on my TS-811). The sense that provides the strongest signal over the majority of the pass is the sense of the downlink for that trans-mitter. And for all but DOVE, it also correlates to the frequency, since the 70 cm transmitters are all on

different frequencies. DOVE is a special case since it's two transmitters are on nearly the same frequency. To make the correlations yourself on DOVE you would need to do the same test as above, but also check which transmitter is in use as indicated by the STATUS line. We normally run TX#2 on DOVE because it is more efficient.
Here is a chart I have hanging on my wall to remind me of which sense to use."

WD0E welcomes confirmations of these observations:

WO-18:
437.075 PSK LHCP (this TX is bad and not normally used)
437.100 RC RHCP (normally in use)

LO-19:
437.153 PSK LHCP
437.125 RC/CW RHCP

AO-16:
437.025 PSK LHCP (not presently in use)
437.050 RC RHCP (in use now)

DO-17:
145.825 TX#1 LHCP
145.825 TX#2 RHCP (normally used, and in use now)

[The AMSAT News Service (ANS) would like to thank Jim White (WD0E) for this bulletin item. Jim White's Internet address is: wd0e@amsat.org]

/EX
SB SAT @ AMSAT $ANS-331.02
LANDLINE BBS WITH ANS BULLEINS

HR AMSAT NEWS SERVICE BULLETIN 331.02 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 27, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-331.02

The AMSAT BBS Network now includes the following BBS's:

CompuServe's HAMNET
Phone: (Local Access)
Location: USA
Baud Rate: Up To 14,400bps
Sysop: Scott Loftness (W3VS)

Western Pacific Database
Phone: 415-453-2854
Location: San Rafael, CA
Baud Rate: Up to 14,400bps V.32bis
Sysop: Daniel C. Dufficy (KH8AF)

The ARRL BBS
Phone: 203-666-0578

Location: Newington, CT
Baud Rate: Up To 14,400bps
Sysop: Luck Hurder (KY1T)

California Amateur Radio Emergency Services (CARES) BBS
Phone: 916-323-4826
Location: Sacramento, CA
Sysop: Gorden Fuller (WB6OVH)

AMSAT East Coast Bulletin Board
Phone: 201-261-2780
Location: New Milford, New Jersey
Baud Rate: Up to 14,400bps
Sysop: Mel Roman (KA2UPD)

HAM>LINK<RBBS
Phone: 612-426-0000
Location: St. Paul, Minnesota
Baud Rate: Up to 9600bps V.32
Sysop: John Desmond (K0TG)

OCA/AMSAT BBS
Phone: 714-738-4331
Location: Fullerton, CA
Baud Rate: Up to 24000bps
Sysop: John Wisniowski (N6DBF)

DRIG BBS
Phone: 214-394-7438
Location: Carrolton, TX
Baud Rate: Up To 14,400bps
Sysop: Jeff Wallach (N5ITU)

GEnie's Radio, Electronics, & Broadcasting RoundTable
Phone: Call 800-638-9638 for information and local access phone number
Location: USA
Baud Rate: Up To 9600bps
Sysop: Larry Ledlow (NA5E)

PC-Ham (Reliable) BBS
Phone: 301-593-9067
Location: Silver Springs, MD
Baud Rate: Up To 9600bps
Sysop: Joe Kasser (W3/G3ZCZ)

The WireNet BBS
Phone: 205-444-9638
Location: Birmingham, Alabama
Baud Rate: Up To 14,400bps
Sysop: Dennis Dease (N4NR)

Top of The Rock BBS
Phone: 404-921-8687

Location: Lilburn, GA
Baud Rate: Up To 14,400bps
Sysop: Steve Driggs (KB4ZTN)

USS Enterprise 1701-D BBS
Phone: 717-752-1468
Location: Berwick, PA
Baud Rate: Up To 2400bps
Sysop: Bill Barnes (N3JIX)

If you run a BBS and would like to join The AMSAT BBS Network, we want to hear from you. Tell us the name of your BBS, phone number, location (city, state), baud rate, sysop's name and callsign, and Internet and/or CompuServe address. Also, what AMSAT, ARRL, etc. files do you post each week?

You can contact me on:
>INTERNET:n6dbf@amsat.org
or
CompuServe: 70233,75

73, John Wisniowski (N6DBF)
AMSAT-NA, BBS Coordinator

/EX
SB SAT @ AMSAT $ANS-331.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 331.03 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 27, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-331.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

12-Dec-93 0435 B 180 W9ODI WB6LLO
3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink
on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-331.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 331.04 FROM AMSAT HQ
SILVER SPRING, MD NOVEMBER 27, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-331.04

Weekly OSCAR Status Reports: 27-NOV-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
AO-13 will experience another partial solar eclipse on 1993 Dec 13 [Mon].
It sees the Moon eclipse the Sun from 10:09 - 10:59 UTC with a maximum 53%
obscuration at 10:34 UTC. This is Orbit #4211 MA 73-92. The encounter
will be "visible" on the telemetry to stations throughout the USA and
Japan. Reports would be appreciated. Stations who observed this
spectacular eclipse of Dec 13 will know what to look for. Eclipses of sun
by earth commence on Dec 07 [Tue] and continue until Dec 24 [Fri]. The
eclipses are of course total. The maximum lasts 2 hours and 16 minutes,
and is the longest AO-13 has ever experienced. The telemetry during these
outages is very interesting, particularly the spacecraft temperatures; some
reach -40 C. The Mode-B transponder will be OFF from MA 95 to 180 during
this two week period. [G3RUH/DB2OS/VK5AGR]

FO-20: The following is the FO-20 operating schedule:
Analog mode: 01-Dec-93 08:43 -to- 07-Dec-93 7:16 UTC
15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC
Digital mode: otherwise noted above. In December, analog mode and
digital mode will be ON alternately for a week, respectively.
[JJ1WTK]

RS-12: RS-12 was very active on the East Coast and Midwest passes
during this last week. Not so active on the West Coast passes.
XE1YMY has been worked many times by RS-12 users in Canada, Arizona,
and Texas. Also, a YV5 station was heard calling on 15M with
no responses! And one can also hear JA stations calling on RS-12 in
the late evening West Coast passes. [KF5WY]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly
OSCAR status reports. If you have a favorite OSCAR which you work on a

regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

373. Building PC Based Satellite Station

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 02:57:22 UTC
From: thanos@reef.cis.ufl.edu
Message-ID: <2dboei$6ur@snoopy.cis.ufl.edu>
Source record: 28433

I would like to build a PC based weather satellite station.
I would appreciate it if anyone out there provides info on
schematics, resources, requirements, etc. I am just starting so I could
use any help I can get.

I appreciate any help,

Thanos Karras

374. Re: Control of Amateur Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 07:12:16 UTC
From: antonio@qualcomm.com
Message-ID: <2dc7cg$2sa@qualcomm.com>
Source record: 28439

In article <2d0g59$429@reznor.larc.nasa.gov>,
Steve Derry <s.d.derry@larc.nasa.gov> wrote:
>For those of you who design, build, and operate amateur radio satellites --
>What do you use for attitude control and knowledge?

For attitude determination, almost all have used sun and earth sensors.
The UoSat series, built at U. of Surrey, have used flux-gate magnetometers.
P3D, now under design, and the most ambitious amateur satellite to date,
is planned to use GPS for attitude determination.

Several different methods of attitude control have been used.

Oscar-10 and Oscar-13 (highly elliptical orbits) use magnetorquers.

UoSat series has used a gravity gradient boom and magnetorquers.

AMSAT's microsat series uses 4 permanent magnets in the spacecraft body
to allign the spacecraft with the earth's magnetic field. A solar propeller
(antenna blades painted white on one side and black on the other) spin the
spacecraft (for thermal control), and finally hysteresis damping rods
limit spin rate, and reduce oscillations. Note these spacecraft are in
nearly polar orbits, so the magnets cause them to flip twice during each
orbit.

P3D is planned to use momentum wheels.

>Is attitude control even necessary for small satellites?

Depends on what you're trying to do. If you're in a very low orbit, and
use nearly omnidirectional antennas, for example, you care a lot less
about attitude than if you're in a near-Molniya (highly elliptical) orbit,
using high-gain antennas to allow low-power users on the earth to communicate
while satellite is near apogee. Amateur radio satellites have covered all
these cases.

>Also, is thermal control strictly passive, or are there heaters on board
>your spacecraft?

Passive. (At least I don't know of any that have heaters. So many
amateur spacecraft have been built, in so many countries, that it's quite
possible that somebody threw in a heater and didn't tell me. :->)

> Thanks!

For more information, may I suggest you joint AMSAT, the non-profit group
that builds and launches these puppies. There is an AMSAT organization in
most major countries. In the US, call 301-589-6062.

A handy reference that lists summary information about many of the amateur spacecraft is: The Satellite Experimenter's Handbook, by Martin Davidoff, published by The American Radio Relay League, Inc, ISBN 0-87259-004-6. I believe you can buy a copy from AMSAT. 2nd edition was published in 1990, so it's a couple of years out of date, and doesn't list the last crop of amateur sats, but it's an excellent starting place.

375. APT-Satellites: Report NOV 28, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 08:45:06 UTC
From: peter.henne@gmd.de
Message-ID: <1993Nov29.084506.24151@gmd.de>
Source record: 28434
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, NOV 28, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 On
Meteor 3-3: APT 137.30 On

Now all NOAA's switch from ch.2 (vis) to ch.3 (IR) when
approaching night-parts of their orbits. The Meteor's transmit
only vis from illuminated parts, as the descending passes are
more and more earlier at morning (exspecially weak Meteor 2-21)
they will become somewhat useless for stations above 40 deg
northern Latitude. Hoping for Meteor 3-6, tentative launch-date
NOV 29 (info from Mike Kenny, Bureau of Meteorology, Australia).

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

376. Re: MIR Packet frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 10:57:52 UTC
From: dave@esi.COM.AU
Message-ID: <4897@eram.esi.COM.AU>
Source record: 28435

In article <754480322.15snx@mu.apana.org.au>,
jmorris@mu.apana.org.au (James Morris) writes:

| >This usualy happens Friday/Saturday nights when they have some spare time.
|
| Friday/Saturday nights.. in which time zone ?

(G'day James!)

Depending on the centricity of the author, it would be: a) USA, b) UTC.
Probably in that order...

--
Dave Horsfall (VK2KFU) VK2KFU @ VK2RWI.NSW.AUS.OC PGP 2.3
dave@esi.COM.AU ...munnari!esi.COM.AU!dave available

377. HELP FOR UNDERGRADUATE PROJECT NEEDED (TA!)

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 14:20:28 UTC
From: JONESGX@IBM3090.BHAM.AC.UK
Message-ID: <932029142028@ibm3090.bham.ac.uk>
Source record: 28436

==========

Hello, having a few problems (correction a LOT of problems) with an undergrad project involving radio astronomy.

This is the info we've been given.....

RADIO ASTRONOMY

We have manufactured two radio telescopes with 2.0m parabolic antennae. These are mounted on ALT-AZ computer controlled drive systems. A receiver working at 1420MHz has also been constructed using very low noise GAS Fet pre-amplifiers.
The project involves the calibration of the radio telescopes by observing bright sources such as the sun and attempting to operate the receiver as a two beam interferometer.

Any suggestions??????!!!!!!!!

What we'd quite like to do is develop the reciever to look around the 21cm line of hydrogen, to make the reciever slightly adjustable around this line to look at redshift and blueshifts in the sky - especially in the milky way.

All help very much appreciated!!

Georgina Jones JONESGX@IBM3090.BHAM.AC.UK
Bruce Rimell RIMELLBD@IBM3090.BHAM.AC.UK

378. * SpaceNews 29-Nov-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 16:49:46 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1129.1993@ampr.org>
Source record: 28437
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1129
* SpaceNews 29-Nov-93 *

BID: $SPC1129

=========
SpaceNews
=========

MONDAY NOVEMBER 29, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* KITSAT-OSCAR-25 NEWS *
========================
KO-25 Operation Status Report 13 (24-Nov-93)

1. General

Kernal and other OBC186 S/Ws are all loaded and running well. Spacecraft is showing healthy condition. Battery is being discharged very small amount compared to KO-23. Still using TX0 as it is showing very good performance.

2. Experiments Carried Out

2.1 CCD Earth Imaging System

Two camaras onboard are showing good pictures of Earth. The Black and white high resolution (200 meter) camera is showing excellent pictures. The color camera with low resolution (2 kilometer) is also showing great images after some color mapping process. Other than the color imager's gain control difficulty, the camera system is working well and taking pictures everyday.

2.2 InfraRed Sensor Experiment (IREX)

IREX has been on since the beginning of the KO-25 operation. This experiment is to acquire I/V characteristics of IR sensors. Passive cooling structure was devised for this experiment and currently we are monitoring the temperature of this cooling system.

3. Experiments on the way

3.1 KASCOM (KAIST Satellite Computer)

The initial check out is on the way. A SaTReC developed multitasking kernel and long-term memory test task are to be commenced the initial test.

3.2 DSPE

38.4 kbps Downlink booster is being developed by utilizing DSPE. Protocol test is still being carried out on the ground.

3.3 LEED (Low Energy Electron Detector)

After sufficient time for outgassing period, in December this device will be turned on.

4. Other Information

The uplink to KO-25 will not be available currently. It will be open with KO-25 BBS service after the system check out completion. Some of the good pictures from KO-25 will be released through KO-23 for the time being.

For more info contact:

hskim@satrec.kaist.ac.kr
FAX) +82 42 861 0064
Tel) +82 42 869 8614
SaTReC, KAIST

[Info via Hyung Shin Kim]

* MICROSAT ANTENNA POLARIZATION *
==========
There has been a certain amount of confusion concerning the sense of the polarization of the Microsat downlinks. The following by Jim White, WD0E, is an attempt to clarify the situation.

The two transmitters in each Microsat are connected to a canted turnstile downlink antenna through a hybrid. The two input ports they are connected to are out of phase with each other. When one transmitter is on, the sense of the downlink will be RHCP, and when the other is on, it will be LHCP. When controllers switch transmitters, they also switch polarization sense. No sense is "normal". During construction there was no attempt to make a particular transmitter a particular sense. The limiting factor was how to fit the semi-rigid cables connecting all the various parts together in the tiny space inside the transmitter module. Additionally, since one of the objectives of the Microsat Project was to create satellites that could be used with very simple portable ground stations using simple omni-directional antennas, there was no need to be concerned about polarization sense.

When receiving with a circularly polarized ground station antennas, miss-matched sense can make several dB of difference at times. The most strongly circular signal (or the one with the lowest eccentricity) will be received by the ground station when the bottom of the satellite is pointed directly at it. For stations at about 35 to 50 degrees north or south latitude, this occurres when the satellites are directly overhead and slightly lower in latitude. For all but LO-19, the turnstile is pointed down in the northern hemisphere. For LO-19, it's down in the southern

hemisphere. At other times the sense is effected by a variety of other influences and cannot be relied on.

If you have a circularly polarized Yagi with switchable sense you can perform a test to see which transmitter provides which polarization. Throughout a pass, but particularly when the satellite is nearly overhead, switch sense every few seconds and see which is stronger. At times you will notice a large difference (AO-16 is 5 S units different on a TS811). The sense that consistantly provides the strongest signal over the majority of the pass is the sense of the downlink for that transmitter. And for all but DOVE, it also correlates to beacon frequency, since the 70 cm transmitters are all on different frequencies.

DOVE is a special case since it's two transmitters are on nearly the same frequency. To make the correlations on DOVE you would need to do the same test as above, but also check which transmitter is in use as indicated by the STATUS line. We normally run TX#2 on DOVE because it is more efficient.

The following provides beacon frequency and polarization sense for all the Microsat satellites:

WO-18:
437.075 PSK LHCP (this TX is bad and not normally used)
437.100 RC RHCP (normally in use)

LO-19:
437.153 PSK LHCP
437.125 RC/CW RHCP

AO-16:
437.025 PSK LHCP (not presently in use)
437.050 RC RHCP (in use now)

DO-17:
145.825 TX#1 LHCP
145.825 TX#2 RHCP (normally used, and in use now)

[Info via Jim White, wd0e@amsat.org]

* CHINA ON SATELLITES *
==========
The Tsinghua University Amateur Radio Club of Beijing, China is happy to report that the Chinese Radio Sports Association has provided them with some OSCAR satellite ground station equipment that they may use for approximately 6 months in an effort to become active on amateur satellites. The equipment consists of a Yaesu FT-726 dual-band transceiver, a crossed Yagi antenna, a 70cm amplifier, a receive preamplifier, and the elevation/ azimuth rotor system. Walter OE2CAL, an Austrian amateur noted in Europe for his V/UHF activities, and Dieter DJ7BU are scheduled to join the radio club in their efforts ot install the antenna system which has been delayed due to snowy weather. Both men are currently working in Beijing.

The students at the Tsinghua University Amateur Radio Club are new to OSCAR operations and are trying very hard to get a station on the air from China. The club is currently in need of satellite reference manuals, books, and satellite tracking software that can help them get on the air.

Information pertinent to satellite operation should be directed to Rick Niu, BY1QH, via any of the following paths:

Packet: BY1QH @ JA5TX.JPN.AS
Internet: Contact gateway_request@arasmith.com for more info
Airmail: Rick Niu
Public Relations Manager TUARC
Room 316 Building 25
Tsinghua University
Beijing 100084, China

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

BY1QH VE1AXJ ZS2LR K7EA OH8UV WD9IYT

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

379. Are non-metallic cross booms necessary?

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 19:34:10 UTC
From: barger@aerospace.aero.org
Message-ID: <2ddiri$ptp@news.aero.org>
Source record: 28438
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

Conventional wisdom says that non-metallic (i.e., fiberglass or similar) material must be used as a cross boom or mast when mounting circularly polarized antennas since the presence of a metallic material will distort the field around the antenna. There are conflicting opinions, however. A similar concern involves routing the feedline so that it doesn't exit the antenna at a position that will disturb the field around the antenna.

Has anyone made any measurements or simulations/models that either confirm or refute these assertions? Are the potential disturbances large enough to make any noticable difference in performance? My particular problem concerns the feedline. I would like to run the feedline along the boom to the cross boom, across the cross boom to the tower rather than have the feedline hang off the end of the antenna and droop to the tower. The drooping feedline can potentially snag on the roof and (as my wife reminds me daily) is not particularily nice to look at.

73 Joe N6KK
barger@aero.org

380. EJASA: SETI Information Source

Newsgroup: rec.radio.amateur.space
Date: 1993-11-29 23:01:30 UTC
From: klaes@verga.enet.dec.com
Message-ID: <2ddulm$igd@nntpd.lkg.dec.com>
Source record: 28440
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.misc

EJASA: SETI Information Source

I am Larry Klaes, Editor of the Electronic Journal of the Astronomical Society of the Atlantic (EJASA), a position I have held since the founding of the EJASA in August of 1989.

The EJASA is published by the Astronomical Society of the Atlantic, Incorporated. The ASA is a non-profit organization dedicated to the advancement of amateur and professional astronomy and space exploration, as well as the social and educational needs of its members. The EJASA is a place for those on the Internet to publish their works on the field. The EJASA is published monthly and posted on the USENET astronomy and space newsgroups.

Numerous articles in the EJASA have been devoted to SETI and its related fields. Included among them is the original six-part paper by Dr. Stuart Kingsley of Columbus, Ohio on his work with Optical SETI in the January 1992 issue. Dr. Kingsley was profiled in the Summer 1993 issue of The Planetary Society's Bioastronomy News publication and spoke at the recent Bioastronomy Conference in Santa Cruz, CA.

Robert Dixon, head of Earth's longest-running SETI program located at Ohio State University, contributed an article on the project's history in the June 1992 issue of the EJASA.

The December issue will feature a SETI article by Guillermo A. Lemarchand from the University of Buenos Aires, Argentina.

The complete list of current SETI articles in the EJASA follows this paragraph. All are available either from me or the ASA anonymous FTP site at chara.gsu.edu (131.96.5.29).

"Does Extraterrestrial Life Exist?", by Angie Feazel - November 1989

"Suggestions for an Intragalactic Information Exchange System", by Lars W. Holm - November 1989

"Radio Astronomy: A Historical Perspective", by David J. Babulski - February 1990

"Getting Started in Amateur Radio Astronomy", by Jeffrey M. Lichtman - February 1990

"A Comparison of Optical and Radio Astronomy", by David J. Babulski - June 1990

"The Search for Extraterrestrial Intelligence (SETI) in the Optical Spectrum, Parts A-F", by Dr. Stuart A. Kingsley - January 1992

"History of the Ohio SETI Program", by Robert S. Dixon - June 1992

"New Ears on the Sky: The NASA SETI Microwave Observing Project", by Bob Arnold, the ARC, and JPL SETI Project - July 1992

"First International Conference on Optical SETI", by Dr. Stuart A. Kingsley - October 1992

"Conference Preview: The Search for Extraterrestrial Intelligence (SETI) in the Optical Spectrum", by Dr. Stuart A. Kingsley - January 1993

I will make available upon request the complete list of EJASA back issues. I will be glad to send on-line copies of any issues to those who wish to see them. Readers are also welcome to submit papers on astronomy and space exploration for publication in the EJASA.

Regards,

Larry Klaes klaes@verga.enet.dec.com
or - ...!decwrl!verga.enet.dec.com!klaes
or - klaes%verga.dec@decwrl.enet.dec.com
or - klaes%verga.enet.dec.com@uunet.uu.net

EJASA Editor, Astronomical Society of the Atlantic

"When we try to pick out anything by itself, we find it hitched to everything else in the Universe." - John Muir

381. ARLK050 Keplerian data

Newsgroup: rec.radio.amateur.space
Date: 1993-11-30 16:21:38 UTC
From: lhurder@arrl.org
Message-ID: <$arlk050.1993@ampr.org>
Source record: 28441
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEP @ ARL $ARLK050
ARLK050 Keplerian data

ZCZC SK62
QST de W1AW
Keplerian Bulletin 50 ARLK050
From ARRL Headquarters
Newington, CT November 30, 1993
To all radio amateurs

SB KEP ARL ARLK050
ARLK050 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

AO-10
1 14129U 83058 B 93328.37358304 0.00000006 10000-3 0 2126
2 14129 27.1967 354.6814 6020029 132.8205 296.5509 2.05877703 50585
RS-10/11
1 18129U 87054 A 93325.49625370 0.00000016 10683-4 0 8136
2 18129 82.9207 122.3575 0010357 239.9809 120.0325 13.72326180321420
UO-11
1 14781U 84021 B 93329.58852952 0.00000248 46105-4 0 6143
2 14781 97.7948 348.7516 0011121 196.5663 163.5164 14.69089775520417
RS-12/13
1 21089U 91007 A 93327.59616256 0.00000030 25224-4 0 6146
2 21089 82.9217 163.9135 0028927 323.6427 36.2770 13.74030145140417
AO-13
1 19216U 88051 B 93324.87971886 -.00000221 10000-4 0 8153
2 19216 57.8676 283.0185 7211074 328.8644 3.5221 2.09724867 10148
UO-14
1 20437U 90005 B 93329.65790977 0.00000093 43895-4 0 9147
2 20437 98.6035 52.0806 0011930 69.3207 290.9251 14.29805964200504
AO-16
1 20439U 90005 D 93329.65139180 0.00000078 38188-4 0 7142
2 20439 98.6116 53.1033 0012281 69.9146 290.3351 14.29862845200515
DO-17
1 20440U 90005 E 93329.69541395 0.00000081 39082-4 0 7141
2 20440 98.6133 53.4054 0012278 69.3547 290.8917 14.30000149200535
```

```
WO-18
1 20441U 90005 F 93329.66728536 0.00000066 33235-4 0 7151
2 20441 98.6131 53.3931 0012865 69.5507 290.7020 14.29977633200530
LO-19
1 20442U 90005 G 93325.67080327 0.00000099 46017-4 0 7134
2 20442 98.6146 49.6483 0013250 80.8874 279.3806 14.30069500199976
FO-20
1 20480U 90013 C 93325.97912877 -.00000005 14514-4 0 6103
2 20480 99.0202 152.1718 0541163 89.0188 277.2925 12.83222068177550
AO-21
1 21087U 91006 A 93327.46610100 0.00000084 82657-4 0 3702
2 21087 82.9432 294.9482 0034102 299.3528 60.4149 13.74528481141311
UO-22
1 21575U 91050 B 93329.66348198 0.00000110 43938-4 0 4140
2 21575 98.4552 43.0587 0007468 171.3856 188.7451 14.36867889123851
KO-23
1 22077U 92052 B 93325.56659606 0.00000000 10000-3 0 3101
2 22077 66.0893 354.6876 0005267 339.3077 20.7715 12.86281948 60088
Arsene
1 22654U 93031 B 93321.93138545 -.00000051 10000-3 0 2107
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
KO-25
1 22827U 93061 E 93325.63062458 0.00000131 60982-4 0 2756
2 22827 98.6738 38.3070 0010219 83.4992 276.7343 14.27794239 8078
IO-26
1 22826U 93061 D 93325.63461159 0.00000078 39608-4 0 2139
2 22826 98.6764 38.3197 0010035 94.7836 265.4492 14.27693538 8074
AO-27
1 22825U 93061 C 93325.63865674 0.00000077 39483-4 0 2127
2 22825 98.6761 38.3168 0009527 93.6148 266.6130 14.27591127 8079
PO-28
1 22829U 93061 G 93299.20720744 0.00000225 10695-3 0 2074
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
Mir
1 16609U 86017 A 93329.00833400 0.00005257 70218-4 0 5983
2 16609 51.6175 131.5118 0004921 24.8845 335.1502 15.58670399444190

Keplerian bulletins are transmitted twice weekly from W1AW.
The next scheduled transmission of these data will be Saturday,
December 4, 1993, at 2330z on Baudot and AMTOR.
NNNN
/EX
```

382. Re: Control of Amateur Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-11-30 23:11:39 UTC
From: chris@cosmo.demon.co.uk
Message-ID: <754701099snz@cosmo.demon.co.uk>
Source record: 28442

In article <2dc7cg$2sa@qualcomm.com> antonio@qualcomm.com writes:

>For attitude determination, almost all have used sun and earth sensors.
>The UoSat series, built at U. of Surrey, have used flux-gate magnetometers.
>P3D, now under design, and the most ambitious amateur satellite to date,
>is planned to use GPS for attitude determination.
>

As far as I know, GPS is only usable for _orbit_ determination, i.e. location in space, and _not_ for attitude determination, i.e. which way the satellite is pointing.

Of course, correct if me if I'm wrong!

Regards,

Chris Payne.

383. Welcome to rec.radio.info!

Newsgroup: rec.radio.amateur.space
Date: 1993-12-01 04:01:46 UTC
From: rec-radio-info@ve6mgs.ampr.ab.ca
Message-ID: <rec.radio.info-welcome_754718490@ve6mgs.ampr.org>
Source record: 28447
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.space,rec.radio.amateur.digital.misc,rec.radio.amateur.policy,rec.radio.shortwave,rec.radio.cb,rec.radio.noncomm,alt.radio.scanner,rec.radio.info,news.answers,rec.answers

```
Archive-name: radio/rec-radio-info/welcome
Last-modified: $Date: 1993/05/16 21:57 $
Version: $Revision: 1.05 $

*** Welcome to rec.radio.info! ***

Welcome to rec.radio.info, a group that aims to provide a noise-free source
of information and news for the entire rec.radio hierarchy.

Two introductory articles about rec.radio.info are posted to the group and
to news.answers every two weeks. You are now reading the first article, which
explains what rec.radio.info is, and answers some Frequently Asked Questions.
The second article is titled "Submission Guidelines", and you only need to
read it if you want to submit an article to rec.radio.info.

You can skip to the next section of this article by searching for the next
" -- " string. The sections available are:
- What is the purpose of rec.radio.info?
- Why are messages almost always cross posted to rec.radio.info?
- What is a 'follow-up', and what does 'moderated' mean?
- OK, so now I know what 'moderated' means. Tell me more.
- What type of material is considered inappropriate?
- I do not have access to news, how can I get the information posted to
rec.radio.info?
- Will the material appearing in rec.radio.info be archived somewhere?
- I have a regular posting with timely information, is there a way to
speed up it's delivery, or automate for more convenience?

-- What is the purpose of rec.radio.info?

The purpose or charter of rec.radio.info is to provide the Usenet community with
a resource for information, news, and facts about any and all things radio.

All the other rec.radio groups are intended for discussions and general chit
chat about radio. Rec.radio.info will contain informational, factual articles
only. Follow-ups are redirected to an appropriate other group, and further
discussion (if any) will not take place in rec.radio.info.

In order to ensure that rec.radio.info contains only appropriate articles, it
was decided to create the group as a moderated newsgroup.

-- Why are messages almost always cross posted to rec.radio.info?

It provides a "tag" for each article to be assembled into a filtered
presentation in rec.radio.info (even with cross-posting, only one message, with
```

a unique Message-ID, is propogated across the net). This tag also facilitates a pre-existing method of dropping or cancelling the articles locally within the discussion groups if you don't want to see them. This accommodates individuals who want to separate the bulletins from the discussions, discussions from the bulletins, as well as those who are adamant about not reading another newsgroup and wanted to see everything all in one basket.

With the total size of Usenet (in number of newsgroups and total traffic) doubling every year or so, this is no insignificant contribution to reducing information noise and chaos. Making the discussion groups a catch-all, and making extra newsgroups filters on that catch-all, is also the most realistic way to implement such a scheme (It's not intuitively obvious what the charter, contents, and general appropriate topics for each and every newsgroup are. Seeing FAQ's and charter/intro postings in the home newsgroup is beneficial for new readers).

By cross-posting one only is adding a few tens of bytes to each bulletin (to specify the extra group on the Newsgroups line), but are adding the capability for very powerful filtering features available on most news servers, listservers and readers. Your local news guru could probably explain these features in more detail.

In rn, for example, according to Leanne Phillips in her rn kill-file FAQ, add a line of the form:
/Newsgroups:.*[,]rec\.radio\.info/h:j
either in ~/News/KILL (if you don't want to see rec.radio.info articles anywhere) or ~/News/rec/radio/amateur/misc/KILL (if you don't want to see them just in rec.radio.amateur.misc). The latter method means your kill file will only be consulted during rec.radio.amateur.misc (and hence runs more efficiently), and will probably work for most people.

In nn, according to Bill Wohler in his nn FAQ, add a line of the form:
rec.radio.info:!s/:^
in ~/.nn/kill (if you don't want to see rec.radio.info articles anywhere), or put the following lines:
sequence
rec.radio.info
rec.radio.
at the end of ~/.nn/init in order to see all the rec.radio.info bulletins first, then read the remaining rec.radio.* without the bulletins.

-- What is a 'follow-up', and what does 'moderated' mean?

If you are new to Usenet and are not familiar with the terminology, you might want to read the general introductory articles found in the newsgroup news.announce.newusers. Doing so will make your life on the net much easier, and will probably save you from making silly beginner's mistakes.

If you think that at this moment you are reading an echo, a conference, or a bulletin board, I'd also strongly suggest a trip over to news.announce.newusers.

For the rest of this article, I will assume you have a basic knowledge of Usenet terminology and mechanics.

A moderated group means that any article that needs to be posted to the group has to be accepted by the moderator of the group. Since we need to ensure that followups to an article (discussion) do not show up in the rec.radio.info newsgroup, the `Followup-To:' header line contains a newsgroup that is appropriate for disussions about the specific article.

-- OK, so now I know what 'moderated' means. Tell me more.

Rec.radio.info is a moderated newsgroup, which means that all articles submitted to the group will have to be approved by the moderator first.

The current moderator of the group is Mark Salyzyn. Submissions to rec.radio.info can be posted, or e-mailed to:

rec-radio-info@ve6mgs.ampr.ab.ca

Comments, criticisms, suggestions or questions about the group can be e-mailed to:
rec-radio-request@ve6mgs.ampr.ab.ca

But before you do so, please be sure to check out the "Submission Guidelines" article.

The influence of the moderator should be minimal and of an administrative nature, consisting chiefly of weeding out obviously inappropriate articles, while making sure correct headers etc. are used for the appropriate ones.

-- What type of material is considered inappropriate?

There are three broad categories of articles which will be rejected by the moderator:

1) Requests for information: rec.radio.info is strictly a one-way street. I receive information in my mailbox; I then post it to rec.radio.info. Requests for specific information belong in the normal discussion newsgroups. If your request gets answered, you might consider passing the answer on to rec.radio.info, though. Especially if you can edit it into a informational, rather than a discussion, format.

2) Obvious discussion articles, or articles that appear unsubstantiated.

3) Commercial stuff: a relatively unbiased test of a radio product would be accepted, but any hint of for-profit might be reason for rejection. For three reasons: This is not the purpose of the list, for-profit is a controversial topic, and this list may be passed onto Amateur Packet Radio (where for-profit is prohibited except under certain provisos).

rec.radio.swap (or possibly comp.newprod) may be more deserving of the posting in any matter.

Similarly, copyrighted material generally cannot be used. If it's TRULY worthwhile to the net, I would recommend obtaining permission from the copyright holder. Please note the source, and if permission was given. I

reserve the right to make the final decision concerning appropriateness in all situations. In most cases, a brief summary of, or pointer to, the copyrighted information may be all I can allow.

-- I do not have access to news, how can I get the information posted to rec.radio.info?

brian@UCSD.EDU (Brian Kantor) has kindly supplied a mail list server for rec.radio.info. Non of the articles will be digested, due to their size, so you will receive individual mailings for every article posted to the group.

Mail sent to radio-info@ucsd.edu will be forwarded to the moderator and thus is an alias to rec-radio-info@ve6mgs.ampr.ab.ca

To subscribe and unsubscribe via the listserver; the format for that is

sub address radio-info
unsub address radio-info

where 'address' is your full mailing address. Send this request to

listserv@ucsd.edu

Note that the server will automatically delete any address that bounces mail. If you leave the address portion blank, it will try to deduce your address from the mail headers. This may not work if you are on bitnet, milnet or some other non-Unix host, so it is recommended to put your return address in any case. For example:

sub mymailbox@myhost.mydomain.mil radio-info
or
sub MEMEME01@DMBHST.bitnet radio-info

or something like that.

-- Will the material appearing in rec.radio.info be archived somewhere?

Yes. Still firming up details at the moment but here is a preliminary list:
- unbc.edu as maintained by Lyndon Nerenberg <lyndon@unbc.edu>
- nic.funet.fi maintained by Risto Kotalampi <rko@cs.tut.fi>
saved to /pub/dx/text/rec.radio.info currently stored as numbered files.

Effectively this means that anything you post to rec.radio.info will be permanently stored, so your work will not be lost.

-- I have a regular posting with timely information, is there a way to speed up it's delivery, or automate for more convenience?

Yes, there is! It may take a bit of chatter with the moderator, but we are willing to take responsible people and provide them the means of posting the articles directly from their site. We will try everything we can as we fully realize that DX (distant signal) and astronomical data can be somewhat transitory. We are also willing to allow regular posters of information the same courtesy, even if the information is not as time critical.

We refer to this as self-moderation, which is partly based on the model for news.answer. This requires co-operation and good will to be beneficial to the community in the rec.radio hierarchy.

I suggest reading the posting guidelines for more information. I am open to suggestions.

I thank the following individuals for their input into this article:
rec.music.info moderator Leo Breebaart rec-music-info@cp.tn.tudelft.nl
rec.radio.broadcasting moderator Bill Pfeiffer wdp@gagme.chi.il.us
Paul W. Schleck, KD3FU pschleck@unomaha.edu
Ian Kluft, KD6EUI ikluft@uts.amdahl.com

--
Mark Salyzyn -- Moderator rec.radio.info
Submissions to: rec-radio-info@ve6mgs.ampr.ab.ca
Administrivia to: rec-radio-request@ve6mgs.ampr.ab.ca
* Requests for information do *not* belong in rec.radio.info *

384. Re: Control of Amateur Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-12-01 11:12:06 UTC
From: antonio@qualcomm.com
Message-ID: <2dhu66$a48@qualcomm.com>
Source record: 28443

In article <754701099snz@cosmo.demon.co.uk>,
Chris Payne <chris@cosmo.demon.co.uk> wrote:
>In article <2dc7cg$2sa@qualcomm.com> antonio@qualcomm.com writes:
>>For attitude determination, almost all have used sun and earth sensors.
>>The UoSat series, built at U. of Surrey, have used flux-gate magnetometers.
>>P3D, now under design, and the most ambitious amateur satellite to date,
>>is planned to use GPS for attitude determination.
>
>As far as I know, GPS is only usable for _orbit_ determination, i.e. location
>in space, and _not_ for attitude determination, i.e. which way the satellite
>is pointing. Of course, correct if me if I'm wrong!

GPS can be used for _both_ orbit determination and attitude determination.
That, in fact, is the intent on P3D. I mentioned only attitude determination
because that's what the original question asked.

The method involves multiple antennas, and differential carrier phase
measurements. The wavelength of the GPS carrier is about one foot.
Carrier phase changes 360 degrees in one wavelength. Suppose you can measure
the relative carrier phase of the signal received via two different
antennas to an accuracy of 3.6 degrees. (I just picked that because
it's 1/100th of a full circle, so it makes the math easy.) So that's
a measurement of carrier phase that's accurate to about 1/100th of a
foot. Now suppose that two antennas on the spacecraft are 5 feet apart.
The accuracy with which we can determine the attitude of the spacecraft
is then on the order of atan(.01/5) = 0.1 degree.

Of course, you can make such measurements using more than one GPS satellite
source, and you can average multiple measurements to improve accuracy.

This is intended to be only a conceptual description, so I've left out
a number of details, but I hope you get the idea. In practice, the
satellite needs several GPS antennas to make this work, so that you have
a high probability of multiple GPS antennas facing toward a GPS satellite
no matter what your attitude is, etc.

This high-tech stuff is always done first on amateur satellites :-).

385. (none)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-01 16:13:54 UTC
From: uucp@asarin.ORG.AR
Message-ID: <gate.V6DwDc1w165w@asarin.org.ar>
Source record: 28446

```
Satellite: INTELSAT 5 F-2
Catalog number: 12089
Epoch time: 93316.34011391
Element set: 507
Inclination: 4.4833 deg
RA of node: 65.5032 deg
Eccentricity: 0.0004321
Arg of perigee: 167.1666 deg
Mean anomaly: 279.9183 deg
Mean motion: 1.00268695 rev/day
Decay rate: -1.37E-06 rev/day^2
Epoch rev: 1005
Checksum: 273

Satellite: INTELSAT 5 F-3
Catalog number: 12994
Epoch time: 93318.41247243
Element set: 112
Inclination: 4.1234 deg
RA of node: 66.3660 deg
Eccentricity: 0.0003531
Arg of perigee: 163.7862 deg
Mean anomaly: 154.9332 deg
Mean motion: 1.00277097 rev/day
Decay rate: 9.9E-07 rev/day^2
Epoch rev: 823
Checksum: 276

Satellite: INTELSAT 5 F-6
Catalog number: 14077
Epoch time: 93318.45390750
Element set: 612
Inclination: 2.5633 deg
RA of node: 71.2496 deg
Eccentricity: 0.0003338
Arg of perigee: 167.6751 deg
Mean anomaly: 287.9989 deg
Mean motion: 1.00266681 rev/day
Decay rate: -2.55E-06 rev/day^2
Epoch rev: 586
Checksum: 318

Satellite: INTELSAT 5 F-8
Catalog number: 14786
Epoch time: 93320.65803884
```

Element set: 521
Inclination: 2.2639 deg
RA of node: 72.2290 deg
Eccentricity: 0.0003383
Arg of perigee: 160.8112 deg
Mean anomaly: 239.5413 deg
Mean motion: 1.00273816 rev/day
Decay rate: 7.9E-07 rev/day^2
Epoch rev: 3645
Checksum: 286

Satellite: INTELSAT 5A F-11
Catalog number: 15873
Epoch time: 93324.30626863
Element set: 220
Inclination: 0.7736 deg
RA of node: 77.9886 deg
Eccentricity: 0.0003287
Arg of perigee: 154.8030 deg
Mean anomaly: 113.8487 deg
Mean motion: 1.00274405 rev/day
Decay rate: 6.1E-07 rev/day^2
Epoch rev: 538
Checksum: 288

Satellite: INTELSAT 5A F-12
Catalog number: 16101
Epoch time: 93320.10528561
Element set: 518
Inclination: 0.2128 deg
RA of node: 86.6661 deg
Eccentricity: 0.0002379
Arg of perigee: 150.7203 deg
Mean anomaly: 214.8430 deg
Mean motion: 1.00275169 rev/day
Decay rate: 1.8E-07 rev/day^2
Epoch rev: 1214
Checksum: 242

Satellite: INTELSAT 5A F-13
Catalog number: 19121
Epoch time: 93317.04756235
Element set: 420
Inclination: 0.0109 deg
RA of node: 220.7814 deg
Eccentricity: 0.0001801
Arg of perigee: 22.8621 deg
Mean anomaly: 132.7088 deg
Mean motion: 1.00271401 rev/day
Decay rate: -2.57E-06 rev/day^2
Epoch rev: 707

Checksum: 233

Satellite: INTELSAT 6 F-3
Catalog number: 20523
Epoch time: 93321.95100523
Element set: 316
Inclination: 0.0147 deg
RA of node: 336.3972 deg
Eccentricity: 0.0000655
Arg of perigee: 259.3126 deg
Mean anomaly: 129.1493 deg
Mean motion: 1.00268888 rev/day
Decay rate: -2.13E-06 rev/day^2
Epoch rev: 649
Checksum: 391

Satellite: INTELSAT VI F4
Catalog number: 20667
Epoch time: 93320.68614126
Element set: 613
Inclination: 0.0125 deg
RA of node: 338.8919 deg
Eccentricity: 0.0001558
Arg of perigee: 220.1098 deg
Mean anomaly: 163.7843 deg
Mean motion: 1.00271848 rev/day
Decay rate: 7.5E-07 rev/day^2
Epoch rev: 580
Checksum: 274

Satellite: INTELSAT 6 F-5
Catalog number: 21653
Epoch time: 93322.14714462
Element set: 513
Inclination: 0.0124 deg
RA of node: 25.2846 deg
Eccentricity: 0.0000851
Arg of perigee: 210.3324 deg
Mean anomaly: 210.0842 deg
Mean motion: 1.00270135 rev/day
Decay rate: -1.59E-06 rev/day^2
Epoch rev: 829
Checksum: 351

Satellite: INTELSAT VI-F1
Catalog number: 21765
Epoch time: 93323.47277801
Element set: 515
Inclination: 0.0055 deg
RA of node: 207.3684 deg
Eccentricity: 0.0000992

Arg of perigee: 16.8105 deg
Mean anomaly: 337.0362 deg
Mean motion: 1.00269796 rev/day
Decay rate: -1.77E-06 rev/day^2
Epoch rev: 746
Checksum: 277

Satellite: INTELSAT K
Catalog number: 21989
Epoch time: 93321.92928887
Element set: 418
Inclination: 0.0634 deg
RA of node: 82.7189 deg
Eccentricity: 0.0001540
Arg of perigee: 171.1641 deg
Mean anomaly: 116.1202 deg
Mean motion: 1.00269461 rev/day
Decay rate: -1.41E-06 rev/day^2
Epoch rev: 1591
Checksum: 266

386. Re: Control of Amateur Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-12-01 16:59:59 UTC
From: n4hy@tang.ccr-p.ida.org
Message-ID: <N4HY.93Dec1165959@tang.ccr-p.ida.org>
Source record: 28445

You are indeed wrong. AMSAT's Phase III-D intends on using GPS to do attitude determination amongst other things. You need multiple antennas and then do interferometry but it can be done.

Bob
--
Robert W. McGwier | n4hy@ccr-p.ida.org Interests: ham radio,
Center for Communications Research | scouts, astronomy,and golf
Princeton, N.J. 08520 | ASM Troop 5700, ACM Pack 53 Hightstown
(609)-279-6240(v) (609)-924-3061(f)| I used to be a Buffalo . . . NE III-120

387. What are Global Positioning satellite frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-01 21:19:44 UTC
From: LIBRARY@utkvx.utk.edu
Message-ID: <01H5YZJ66GBO8WW96V@utkvx.utk.edu>
Source record: 28444

Path:
news.csuohio.edu!usenet.ins.cwru.edu!howland.reston.ans.net!cs.utexas.edu!not-for-mail
From: bmm1@freenet.scri.fsu.edu (Bruce M. Marshall)
Newsgroups: rec.radio.scanner
Subject: What are Global Positioning satellite frequencies?
Date: 1 Dec 1993 14:34:05 -0600
Organization: UTexas Mail-to-News Gateway
Lines: 13
Sender: daemon@cs.utexas.edu
Message-ID: <199312012033.AA15653@freenet2.scri.fsu.edu>
NNTP-Posting-Host: news.cs.utexas.edu

Does anyone know where I can get technical data on the global
positioning system satellites? Specifically I would like to know their
frequencies, modulation type, data format and how many of them are
presently in orbit. It would also be interesting to know their norad
designation, orbital elements and some spacecraft statistics like
power source and rf transmit power.

I have found lots of information on how to use the equipment but
nothing technical on the whole system.

thanks.
--
Bruce M. Marshall bmm1@freenet.fsu.edu voice 615 481 0990 fax 615 481 8039

388. Re: Are non-metallic cross booms necessary?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-02 00:35:03 UTC
From: raichel@HAN.Paramax.COM
Message-ID: <CHDtMG.DDs@HAN.Paramax.COM>
Source record: 28448
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.antenna

The latest AMSAT proceadings has an artical on this subject.
The authour said that if the elements are mounted 45 degrees from the
crossboom (look like an x instead of + when look at antenna from the
front or rear), then there is NO PROBLEM with using a steel cross boom,
and running the feed lines down the boom AS LONG AS the cross boom is
not mounted at points n*1/2 wavelengths from the feed point.

He shows charts of the metal boom running 0, 45 and 90 degrees,
through the elements. At 0 and 90 degrees, there was LOTS of interfearence,
while at 45 degrees, there was very little. This is because the metal boom
is not in the same plane of EITHER of the two planes of elements.

He also shows charts saying that if the cross boom is mounted at
multiples of 1/2 wavelengths from the driven element, even if it is not
in the same plane as the elements (45 degrees), there wsa interfearance.
There was minimal interferance if the boom was mounted anywhere else.

I can't remmember the exact title of the artical, or publication
from AMSAT since I looked at a friends copy. :-) But I think that it
was the latest AMSAT meeting proceadings. Check with AMSAT.

I have a pair of KLM 22CX and 40CX Oscar antennas on a 5 foot
tripod with AZ/EX rotors on my roof. I use these antennas for both terestial
and OSCAR work since I do not have enough room for two antenna systems.
I have tried mounting the antennas at a 45 degree angle
(x VS +) configuration. I found that the x configurations performed
VERY POORLY in terestrial contacts (cross polarization?), but OK for
OSCAR use. So I am stuck with using the + configuration which performed
MUCH better for me, but REQUIRES a non conductive cross boom.

Phase II of my antenna project is to phase a PAIR of KLM 22CX and
a PAIR of KLM 40cx antennas. This requires a 11-12 foot cross boom!
Any suggestions where I can get a 1.5" or 2" 12 foot solid fiberglass
rod that can support a 20 pound antenna in 70 MPH winds over a 6 foot
unsupported span? That is why I was REALLY interested in the above artical!

My current crossboom is a 5' fiberglass rod. I cracked it
a couple of months ago when the coax from the 40cx caught on a bolt on
the tripod! I have shortened the coax, so I don't think that the problem
will happend again. But I do not know how much longer the cracked
fiberglass rod can hold out in the upcomming winter storms!

The coax
(4XL) was not damaged because I have a ground wire attached to the boom of
the antenna, and taped to the coax. Fortuantely, the 12 guage copper wire

took most of the strain, and not the N connector on the coax! (The
ground wire is there to hopefully, dissapate static charges, and hopefully
ward off lightning strikes. I have never been hit by lightning so it
must work right? :-))

Thanks
alan

Name: Alan Raichel If you think the answer is simple,
Call: N3IKI then you probabaly don't understand
Inet: raichel@han.paramax.com the question.
ICBM: 39'10' N 76'30' W #include <std_disclaimer.h>

389. Re: What are Global Positioning satellite frequencies?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-02 10:25:41 UTC
From: cpuig@infoserv.com
Message-ID: <931202.022541.7r1.rusnews.w165w@cpuig.infoserv.com>
Source record: 28449

LIBRARY@utkvx.utk.edu writes:

> Does anyone know where I can get technical data on the global
> positioning system satellites? Specifically I would like to know their
> frequencies, modulation type, data format and how many of them are
> presently in orbit. It would also be interesting to know their norad
> designation, orbital elements and some spacecraft statistics like
> power source and rf transmit power.
>
> I have found lots of information on how to use the equipment but
> nothing technical on the whole system.
>

The current issue (December 1993) of IEEE Spectrum magazine has a very informative article (starting on p. 36) with the information you need. It provides a historical overview of radio-positioning systems.

--
Carlos Puig, KJ6ST cpuig@infoserv.com Campbell, CA

390. NASA STS-61 Shuttle Retransmissions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-02 11:15:00 UTC
From: stocker@nssdca.gsfc.nasa.gov
Message-ID: <2DEC199307153499@nssdca.gsfc.nasa.gov>
Source record: 28450

INTERESTED IN THE HST REPAIR MISSION

The Goddard Amateur Radio Club (GARC) W3NAN invites interested people to tune in to Shuttle transmissions. As a public service to the Amateur radio community, the GARC retransmits space shuttle air-to-ground communications. During the STS-61 mission, Amateur radio operators, shortwave listeners, and those individuals with scanners can listen to these communications on the following HF (single side band) and VHF frequencies:

3.860 MHz (lower sideband)
7.185 MHz (lower sideband)
14.295 MHz (upper sideband)
21.395 Mhz (upper sideband)
28.650 Mhz (upper sideband)

and

147.45 Mhz (FM)

Erich Stocker
N3OXM
Public Information Coordinator (GARC)

391. NORAD #300 2-Line Keplerian Elements

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 12:40:20 UTC
From: postmaster@asarin.ORG.AR
Message-ID: <gate.XLTZDc1w165w@asarin.org.ar>
Source record: 28460

```
NORAD #300 2-Line Keplerian Element Sets

Alouette 1
1 00424U 62049 93329.84833505 .00000069 00000-0 77654-4 0 9159
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2 10684 64.5250 52.1204 0063965 162.2632 197.9641 1.98069643100530
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2 10893 63.6507 291.1572 0209861 13.6317 346.9160 2.01627566113823
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2 10953 9.7444 51.1580 0005087 90.2017 303.4537 1.00299095 9602
SeaSat 1
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2 10967 108.0029 39.3763 0002947 258.7787 101.3036 14.37893105806999
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2 11054 63.3520 287.8029 0043224 175.3967 184.6393 1.93505112110532
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Cosmos 1574
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GOES 7
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Kvant-1
1 17845U 87030A 93329.00835075 .00008113 00000-0 10989-3 0 6425
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1 18123U 87053A 93329.97815434 .00000001 00000-0 10000-4 0 1342
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Meteor 2-16
1 18312U 87068A 93329.65100409 .00000046 00000-0 36209-4 0 2149
2 18312 82.5573 13.2888 0011814 330.6454 29.4033 13.84014349316904
Meteor 2-17
1 18820U 88005A 93329.76014581 .00000068 00000-0 55353-4 0 2136
2 18820 82.5423 70.4092 0017640 35.6189 324.6118 13.84698624294200
DMSP B5D2-4
1 18822U 88006A 93329.98580741 .00001771 00000-0 80386-3 0 2370
2 18822 98.4639 188.0701 0005805 211.5967 148.4902 14.22903855301625
Glonass 34
1 19163U 88043A 93325.53794313 .00000024 00000-0 10000-3 0 8124
2 19163 64.9976 117.4118 0008108 169.7076 190.3253 2.13103128 42234
Glonass 36
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METEOSAT 3
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Meteor 3-2
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2 19336 82.5382 108.9623 0018510 57.6406 302.6575 13.16961911256238
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2 19503 65.7469 356.3992 0006133 176.2057 183.8479 2.13102194 40293
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TDRS 2
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Glonass 40
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2 19802 55.0782 147.8014 0035643 173.3617 186.7271 2.00568502 34954
Akebono
1 19822U 89016A 93326.70615543 .00010494 00000-0 62955-3 0 1316
2 19822 75.0893 298.4933 3844322 81.7887 319.1313 7.72608089 93278
Meteor 2-18
1 19851U 89018A 93320.51300057 .00000045 00000-0 35160-4 0 2124
2 19851 82.5191 313.4772 0015680 100.7230 259.5690 13.84349177238266
MOP-1
1 19876U 89020B 93320.12276759 .00000034 00000-0 10000-3 0 7131
2 19876 0.1331 327.1965 0002329 266.6775 226.3326 1.00290562 4990
TDRS 3
1 19883U 89021B 93325.77356142 -.00000236 00000-0 00000+0 0 8165
2 19883 0.0905 68.4921 0004811 250.0604 339.6688 1.00267514 87381
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1 20061U 89044A 93328.15656647 -.00000026 00000-0 10000-3 0 8182
2 20061 54.7480 324.8034 0125532 205.1298 154.2667 2.00566140 32682
Nadezhda 1
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2 20103 82.9599 78.4956 0038392 137.4299 222.9816 13.73828910220241
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2 20217 0.0890 87.2565 0001003 265.7621 306.7489 1.00264944 16023
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Meteor 3-3
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COBE
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2 20322 98.9869 339.3661 0009339 125.4443 234.7457 14.03426038205266
Kvant-2
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Glonass 56
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2 22275 54.6906 204.7678 0052980 256.4268 103.1169 2.00556351 6768
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2 22314 0.6470 72.3757 0003530 210.2637 274.6258 1.00543554 3266
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FO-20
1 20480U 90013C 93325.97912877 -.00000005 00000-0 14514-4 0 6104
2 20480 99.0202 152.1718 0541163 89.0188 277.2925 12.83222068177550
MOS-1B R/B
1 20491U 90013D 93327.66445426 -.00000434 00000-0 -78970-3 0 9155
2 20491 99.0376 192.7812 0470314 329.5760 27.8697 13.02983958179894
LACE
1 20496U 90015A 93327.34922219 .00003172 00000-0 11025-3 0 3171
2 20496 43.0993 137.9638 0011635 116.9119 243.3737 15.31689324209936
Nadezhda 2
1 20508U 90017A 93328.68028995 .00000042 00000-0 37864-4 0 9149
2 20508 82.9562 213.2432 0045981 89.0463 271.5927 13.73463675187478
OKEAN 2
1 20510U 90018A 93329.64487400 .00000347 00000-0 46144-4 0 2142
2 20510 82.5243 13.8646 0020191 131.5852 228.7113 14.78186764201593
INTELSAT-6
1 20523U 90021A 93328.34868552 -.00000209 00000-0 20000-3 0 3171
2 20523 0.0248 302.2022 0000252 217.3502 354.7648 1.00268511 6555
GPS BII-07
1 20533U 90025A 93327.34865371 -.00000026 00000-0 10000-3 0 8150
2 20533 55.0849 325.2997 0040258 83.9653 276.5154 2.00564220 26780
PegSat
1 20546U 90028A 93327.86704969 .00006641 00000-0 17377-3 0 5237
2 20546 94.1141 182.7448 0081035 0.4382 359.6423 15.35446623200718
HST
1 20580U 90037B 93326.53889941 .00000818 00000-0 69765-4 0 3644
2 20580 28.4673 123.5668 0004218 266.1154 93.8990 14.92930899195195
MACSAT 2
1 20608U 90043B 93325.64495529 .00000290 00000-0 48681-4 0 9136
2 20608 89.9210 181.4469 0108658 95.9466 265.4138 14.64592162188902
Glonass 44
1 20619U 90045A 93327.43568741 -.00000016 00000-0 00000+0 0 9388
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2 20619 65.3410 355.9603 0025933 215.3796 144.5034 2.13102785 27363
Glonass 45
1 20620U 90045B 93328.49274049 -.00000015 00000-0 00000+0 0 9303
2 20620 65.3413 355.9209 0003897 43.8576 316.2507 2.13102912 27393
Glonass 46
1 20621U 90045C 93328.08725023 -.00000016 00000-0 10000-3 0 6158
2 20621 65.3239 355.9768 0014431 199.8811 160.1027 2.13100410 27394
Kristall
1 20635U 90048A 93329.00835075 .00008113 00000-0 10989-3 0 5350
2 20635 51.6160 131.5174 0005084 25.3034 334.8161 15.58669008444212
ROSAT
1 20638U 90049A 93328.63311520 .00000356 00000-0 33396-4 0 2172
2 20638 52.9858 189.9002 0012853 161.2640 198.8161 15.06492684191231
Meteor 2-19
1 20670U 90057A 93325.62861582 .00000015 00000-0 79036-5 0 7136
2 20670 82.5482 13.3392 0016493 14.8236 345.3422 13.84182354171904
CRRES
1 20712U 90065A 93328.91381054 .00000717 00000-0 72392-3 0 7795
2 20712 17.8562 272.2223 7195339 34.7957 355.7717 2.34849583 21076
GPS BII-08
1 20724U 90068A 93327.16634959 .00000032 00000-0 10000-3 0 7150
2 20724 54.7155 146.2480 0108636 155.2598 205.3043 2.00562686 24208
Feng Yun1-2
1 20788U 90081A 93328.48349679 .00000252 00000-0 18963-3 0 8200
2 20788 98.8532 350.0422 0014012 223.1985 136.8069 14.01338587165034
Meteor 2-20
1 20826U 90086A 93325.46973098 .00000030 00000-0 21632-4 0 7123
2 20826 82.5229 311.2459 0011806 272.8085 87.1723 13.83564132159033
GPS BII-09
1 20830U 90088A 93329.21192080 -.00000004 00000-0 10000-3 0 7152
2 20830 55.3479 88.4557 0068645 107.0819 253.6515 2.00556651 23327
GPS BIIA-10
1 20959U 90103A 93327.12576115 .00000033 00000-0 10000-3 0 6155
2 20959 54.9436 148.1175 0077078 222.3348 137.1202 2.00571813 21879
DMSP B5D2-5
1 20978U 90105A 93328.63363305 .00000255 00000-0 98898-4 0 3403
2 20978 98.7162 26.5401 0080194 46.4108 314.3689 14.32327464155825
Glonass 47
1 21006U 90110A 93327.17998930 .00000024 00000-0 00000+0 0 5452
2 21006 64.9171 116.3177 0060413 185.9942 173.9358 2.13102789 23045
Glonass 48
1 21007U 90110B 93328.30289378 .00000023 00000-0 00000+0 0 6346
2 21007 64.9271 116.3317 0037656 177.6508 182.3571 2.13101054 23070
Glonass 49
1 21008U 90110C 93328.65815115 .00000023 00000-0 00000+0 0 6349
2 21008 64.9177 116.2814 0007738 280.4946 79.3707 2.13099186 23050
INFORMTR-1
1 21087U 91006A 93327.46610100 .00000084 00000-0 82657-4 0 3703
2 21087 82.9432 294.9482 0034102 299.3528 60.4149 13.74528481141311
Cosmos 2123
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1 21089U 91007A 93327.59616256 .00000030 00000-0 25224-4 0 6147
2 21089 82.9217 163.9135 0028927 323.6427 36.2770 13.74030145140417
MOP-2
1 21140U 91015B 93329.39213764 .00000019 00000-0 10000-3 0 6132
2 21140 0.3281 47.1726 0000962 283.4177 234.2704 1.00262199 4949
Nadezhda 3
1 21152U 91019A 93329.39003114 .00000055 00000-0 52538-4 0 7139
2 21152 82.9242 118.1627 0043177 63.1241 297.4321 13.73490890135400
Glonass 50
1 21216U 91025A 93329.07500218 -.00000015 00000-0 10000-3 0 2105
2 21216 65.0934 355.7407 0011604 214.4943 145.4918 2.13103566 20596
Glonass 59
1 22512U 93010A 93328.52949732 .00000023 00000-0 00000+0 0 4349
2 22512 64.8811 115.8444 0009367 188.9886 170.9946 2.13102081 5764
Glonass 60
1 22513U 93010B 93329.40872544 .00000022 00000-0 00000+0 0 4466
2 22513 64.8686 115.8206 0007138 182.2564 177.7366 2.13102786 5971
Glonass 61
1 22514U 93010C 93327.29771440 .00000023 00000-0 00000+0 0 4309
2 22514 64.8818 115.8784 0014161 184.1168 175.8678 2.13101874 5922
ASTRO-D
1 22521U 93011A 93325.30070055 .00001242 00000-0 10332-3 0 2138
2 22521 31.1049 301.2194 0076913 222.2565 137.2199 14.92714281 40995
UHF F1
1 22563U 93015A 93326.56947811 -.00000156 00000-0 10000-3 0 2079
2 22563 27.0068 302.7968 0007859 265.8703 5.4591 0.99251149 6783
GPS BIIA-19
1 22581U 93017A 93328.11234918 -.00000029 00000-0 10000-3 0 2182
2 22581 55.0118 25.8861 0041409 33.2100 327.0893 2.00575313 4841
ProgressM17
1 22588U 93019A 93328.50263751 .00015586 00000-0 13863-3 0 3567
2 22588 51.6175 128.1151 0003073 19.6307 340.4443 15.68704529 37188
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
GPS BIIA-20
1 22657U 93 32 A 93293.34104706 -.00000026 00000-0 99999-4 0 2058
2 22657 55.0640 27.0832 0058790 200.2063 159.5847 2.00574751 6824
GPS BIIA-21
1 22700U 93042A 93329.70656335 -.00000019 00000-0 10000-3 0 2145
2 22700 54.6504 266.4946 0025926 306.2961 53.4644 2.00570779 3001
Soyuz TM-17
1 22704U 93043A 93329.00835155 .00008113 00000-0 10989-3 0 2364
2 22704 51.6160 131.5174 0005084 25.3034 334.8206 15.58669008444211
NOAA 13
1 22739U 93050A 93339.47171040 -.00000015 00000-0 20836-5 0 2108
2 22739 98.9259 279.8506 0009442 312.2291 47.9102 14.10865880 16644
GPS BIIA-22
1 22779U 93054A 93329.29400957 -.00000026 00000-0 10000-3 0 2222
2 22779 54.8884 325.5346 0027262 229.2113 130.5540 2.00556799 1746
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Meteor 2-21
1 22782U 93055A 93325.65877278 .00000101 00000-0 87052-4 0 2121
2 22782 82.5509 10.8972 0023907 87.2237 273.1663 13.82992586 11406
SPOT 3
1 22823U 93061A 93325.71505707 .00000194 00000-0 10000-3 0 2193
2 22823 98.7384 38.1146 0000958 80.7776 279.3479 14.20026835 8031
STELLA
1 22824U 93061B 93325.65817305 .00000046 00000-0 26930-4 0 2126
2 22824 98.6793 38.3198 0007357 91.9522 268.2544 14.27094113 8072
KO-25
1 22825U 93061C 93325.63865674 .00000077 00000-0 39483-4 0 2128
2 22825 98.6761 38.3168 0009527 93.6148 266.6130 14.27591127 8079
POSAT-1
1 22826U 93061D 93325.63461159 .00000078 00000-0 39608-4 0 2130
2 22826 98.6764 38.3197 0010035 94.7836 265.4492 14.27693538 8074
HEATHSAT
1 22827U 93061E 93325.63062458 .00000131 00000-0 60982-4 0 2757
2 22827 98.6738 38.3070 0010219 83.4992 276.7343 14.27794239 8078
ITAMSAT
1 22828U 93061F 93326.61170949 .00000061 00000-0 32635-4 0 2129
2 22828 98.6738 39.2798 0010455 80.2690 279.9381 14.27794111 8210
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93329.75587440 .00000078 00000-0 39496-4 0 2140
2 22830 98.5755 41.8168 0012580 55.8337 304.4036 14.28018454 8668
ProgressM20
1 22867U 93064A 93325.09506298 -.00000264 00000-0 00000+0 0 249
2 22867 51.6279 151.1396 0009457 79.4698 280.9942 15.60141603443586
1993 067A
1 22875U 93067A 93328.70129199 .00016125 00000-0 34576-3 0 277
2 22875 82.9406 235.5081 0873837 28.0418 336.5216 13.89590786 336
GPS BIIA-23
1 22877U 93068A 93327.35133351 -.00000003 00000-0 10000-3 0 157
2 22877 55.0736 86.7129 0029173 280.4156 79.2217 2.00560519 595
1993 068B
1 22878U 93068B 93328.10561505 .00006156 00000-0 23162-3 0 144
2 22878 35.1522 245.9200 0057602 59.2426 301.3741 15.24923106 4328
Gorizont 28
1 22880U 93069A 93327.34689051 -.00000204 00000-0 00000+0 0 231
2 22880 1.4113 276.3326 0004600 287.6382 73.4351 1.00278663 272
1993 069D
1 22883U 93069D 93327.29628883 -.00000331 00000-0 00000+0 0 22
2 22883 1.4600 279.5949 0005113 310.8696 49.5934 1.00492222 279
1993 069E
1 22884U 93069E 93324.95658819 .00003662 00000-0 91178-3 0 114
2 22884 47.3294 268.9461 7285588 6.0662 359.2843 2.27872799 540
1993 069F
1 22885U 93069F 93325.88065108 .00001364 00000-0 98831-3 0 98
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2 22885 47.3769 268.8193 7265924 6.1976 359.2088 2.27383043 573
Cosmos 2266
1 22888U 93070A 93327.60745577 .00000024 00000-0 19076-4 0 154
2 22888 82.9530 236.8694 0046898 235.3423 120.5616 13.74205182 174
1993 070B
1 22889U 93070B 93325.90449551 .00001304 00000-0 13123-2 0 189
2 22889 82.9461 238.0707 0045161 216.9286 140.9058 13.76507807 2686
Cosmos 2267
1 22904U 93071A 93329.24210181 .00129442 94233-5 22614-3 0 416
2 22904 70.3862 156.3670 0038951 135.4871 224.6251 16.00501837 3194
1993 066B
1 22906U 93066B 93329.39096067 .00079143 44022-5 12533-2 0 199
2 22906 6.9583 291.3684 7335107 206.9438 82.6363 2.26242005 374
1993 072A
1 22907U 93072A 93328.63191333 -.00000243 00000-0 00000+0 0 52
2 22907 1.4933 277.9403 0037846 60.5324 84.5536 1.00536466 60
1993 072B
1 22908U 93072B 93325.07576168 .13461502 61671-4 15488-3 0 126
2 22908 51.6548 261.8270 0005037 307.4261 52.7459 16.49846120 414
1993 072D
1 22910U 93072D 93326.69464345 -.00000037 00000-0 10000-3 0 74
2 22910 1.4974 277.8373 0014824 15.0081 151.4124 1.03165940 43
1993 073A
1 22911U 93073A 93329.30747106 -.00000102 00000-0 00000+0 0 142
2 22911 0.1409 269.7652 0164691 178.6464 331.9955 1.02864111 123
1993 073B
1 22912U 93073B 93326.65743543 -.00000043 00000-0 00000+0 0 75
2 22912 1.2187 281.9234 0010287 20.8259 338.4078 1.00525388 61
1993 073C
1 22913U 93073C 93326.11247928 .00326987 97823-5 26969-1 0 56
2 22913 6.7382 255.1865 7360381 178.5585 186.4148 2.20843869 53
1993 073D
1 22914U 93073D 93326.48003462 .00061301 00000-0 79166-2 0 61
2 22914 6.9342 253.6283 7296032 179.8727 181.0422 2.28007848 44
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73's de Ed Sweet - LU7AKC @ LU7AKC.#COL.CF.ARG.SOAM
postmaster@asarin.org.ar
```

392. TNC NB-96 Spike

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 13:46:10 UTC
From: ae517@Freenet.carleton.ca
Message-ID: <CHGowz.6Jq@freenet.carleton.ca>
Source record: 28452

From : VK7KKK
To : TNC @WW
Type/status : BF
Date/time : 21-Nov 01:46
Bid : 27096_VK7GL
Message # : 23739
Title : PacComm TNC NB-96 Spike and
Path: !VE3MMF!VE4KV!KM6WU!K6IYK!VK7GL!

From: VK7KKK@VK7GL.TAS.AUS.OC
To : TNC@WW

Originated From: VK7KKK 93/11/21 12:39 Msg# 160

****

18 November1993
From Derek, VK7KKK@VK7GL.TAS.AUS.OC
To All users of PacComm TNC NB-96
== ==========

Dear all,

I have been using the PacComm TNC NB-96 for its 9600 Baud capability,
on (UO14) microsat work.

I have been plagued by a large voltage transient at the start and
end of each packet sent. On the high range setting of the jumper JP-9
the transient has a full 8 volts amplitude, going in one direction at
the start of the packet sent, and the other way at the end of the data
packet. The transient lasts about 5 msec. The transient amplitude on
high range will be 8 V regardless of the setting of the TX audio output
level control. If you are using about 1-1.5 volts p-p on your varactor,
as I am, you will be greeted by a brief carrier deviation well outside
the passband of the (supposedly) narrowband channel you are on.

In addition, the handbook states there is TX audio present all the tme.
This is misleading, as the TX audio muting is in fact presettable using
JP-18.

My upload signal persistently required many retries to get data up,
which led me to suspect everything fro the antennas to the keyboard,
although I suspected the TNC and was never happy with the spike. Then
one day I found it would not upload at all. This forced a full
investigationwhich revealed that the spike in fact was upsetting the 5 V regulator
used to derive the varactor bias, causing brief oscillation of the regulator.
Unfortunately for me, the same regulator supplies my transmit crystal

oscillator. The B+ voltage glitch would have caused appreciable signal deviation which translated out as distortion on the received signal at the satellite.

I wrote to PacComm outlining the symptoms, and they replied as follows:

> The manual is wrong, the TX Audio is now clamped by a VMOS FET when
> the unit is not keyed (this is shown on th schematic). It may be
> this clamp which is giving the transient, but we will reserve judgement
> on that now.

One day later this further message arrived:

> .....the solution to your problem. Try moving JP18 from pins 1-2
> to 2-3. This disables the TXA muting FET. If you study the circuit
> you'll see that C34 (1uF) and R47 (4k7) make a great 5ms timer.
> This produces the spikes you are seeing. The MC-NB96 doesn't have
> this mute which is why you didn't see it before.

> You should now get transient-free TXA. I am requesting a circuit
> modification to wire the FET across the level pot, further back
> in the circuit where it shouldn't produce the same problem.

> This problem will only occur with JP9 set at 1-2 (high). Most
> people run it on 2-3 so the problem hasn't been seen.

My fix to the problem (before I got that message) had been to run the TX Audio flat out (8 Volts p-p) so the transient "disappeared" into the signal. I attenuated the signal with a trimpot outside the unit, before the modulator. The improvement was dramatic. However, if you are using one of these units, I suggest you alter the jumper setting as they suggest above....and note it in the handbook!

Happy packeting.
Cheers de Derek VK7KKK@VK7GL.TAS.AUS.OC
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393. Re: NASA STS-61 Shuttle Retransmissions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 13:49:05 UTC
From: bap@mace.cc.purdue.edu
Message-ID: <CHGp1u.M9t@mentor.cc.purdue.edu>
Source record: 28451

Last evening from West central Indiana I tried all evening
to get the GARC SSB frequencies 3860, 7185, 14295, 21395, and 28650.
3860 had a lot of stuff on it but I couldn't get it clearly. I heard
someone say "Endeavor" faintly but that was all. When I do get something
what should I expect? Continuous transmission? Also where is the GARC
transmitter and what is its power and asimuth? Is Indiana
too far away to get it?
I am using a DX-390 with 140 longwire.
Did anyone else hear anything.
I did get the launch on 5180 SSB at 427 AM EST :-)

Sincerely,

BRET A. PENNINGTON
COMPUTER TECHNICIAN
DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES
CIVL 4252 4-0678 (317-494-0678)
PURDUE UNIVERSITY
WEST LAFAYETTE, INDIANA 47907
bap@mace.cc.purdue.edu

394. ORBS$337.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:00:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-337.o.1993@ampr.org>
Source record: 28453
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-337.O
Orbital Elements 337.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX December 3, 1993
BID: $ORBS-337.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93328.37358304
Element set: 212
Inclination: 27.1967 deg
RA of node: 354.6814 deg
Eccentricity: 0.6020029
Arg of perigee: 132.8205 deg
Mean anomaly: 296.5509 deg
Mean motion: 2.05877703 rev/day
Decay rate: 6.0e-08 rev/day^2
Epoch rev: 7855
Checksum: 302

Satellite: UO-11
Catalog number: 14781
Epoch time: 93334.56060295
Element set: 615
Inclination: 97.7956 deg
RA of node: 353.4973 deg
Eccentricity: 0.0011482
Arg of perigee: 179.8391 deg
Mean anomaly: 180.2820 deg
Mean motion: 14.69091713 rev/day
Decay rate: 2.00e-06 rev/day^2
Epoch rev: 52114
Checksum: 308

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93332.42270253
Element set: 814
Inclination: 82.9259 deg
RA of node: 117.2417 deg
Eccentricity: 0.0010740
Arg of perigee: 217.0444 deg
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Mean anomaly: 143.0089 deg
Mean motion: 13.72327034 rev/day
Decay rate: 5.9e-07 rev/day^2
Epoch rev: 32237
Checksum: 273

Satellite: AO-13
Catalog number: 19216
Epoch time: 93334.89295688
Element set: 819
Inclination: 57.9062 deg
RA of node: 281.3321 deg
Eccentricity: 0.7211239
Arg of perigee: 329.5060 deg
Mean anomaly: 3.4438 deg
Mean motion: 2.09727727 rev/day
Decay rate: -2.93e-06 rev/day^2
Epoch rev: 4185
Checksum: 325

Satellite: FO-20
Catalog number: 20480
Epoch time: 93330.50118171
Element set: 611
Inclination: 99.0189 deg
RA of node: 155.8314 deg
Eccentricity: 0.0541157
Arg of perigee: 78.7761 deg
Mean anomaly: 287.3633 deg
Mean motion: 12.83222138 rev/day
Decay rate: -1.9e-07 rev/day^2
Epoch rev: 17813
Checksum: 294

Satellite: AO-21
Catalog number: 21087
Epoch time: 93334.52703634
Element set: 372
Inclination: 82.9438 deg
RA of node: 289.7212 deg
Eccentricity: 0.0034068
Arg of perigee: 279.0086 deg
Mean anomaly: 80.7210 deg
Mean motion: 13.74529132 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 14229
Checksum: 299

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93335.60629654

Element set: 616
Inclination: 82.9186 deg
RA of node: 157.9722 deg
Eccentricity: 0.0028484
Arg of perigee: 300.8203 deg
Mean anomaly: 59.0141 deg
Mean motion: 13.74031015 rev/day
Decay rate: 6.2e-07 rev/day^2
Epoch rev: 14150
Checksum: 285

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

395. ORBS$337.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:02:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-337.d.1993@ampr.org>
Source record: 28454
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-337.D
Orbital Elements 337.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX December 3, 1993
BID: $ORBS-337.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93334.69642848
Element set: 915
Inclination: 98.6046 deg
RA of node: 57.0601 deg
Eccentricity: 0.0011889
Arg of perigee: 55.3459 deg
Mean anomaly: 304.8840 deg
Mean motion: 14.29806558 rev/day
Decay rate: 6.6e-07 rev/day^2
Epoch rev: 20122
Checksum: 320

Satellite: AO-16
Catalog number: 20439
Epoch time: 93334.68970974
Element set: 715
Inclination: 98.6123 deg
RA of node: 58.0868 deg
Eccentricity: 0.0012249
Arg of perigee: 55.8918 deg
Mean anomaly: 304.3434 deg
Mean motion: 14.29863405 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 20123
Checksum: 321

Satellite: DO-17
Catalog number: 20440
Epoch time: 93334.66327841
Element set: 715
Inclination: 98.6134 deg
RA of node: 58.3203 deg
Eccentricity: 0.0012311
Arg of perigee: 55.5998 deg
```

Mean anomaly: 304.6342 deg
Mean motion: 14.30000807 rev/day
Decay rate: 6.2e-07 rev/day^2
Epoch rev: 20124
Checksum: 264

Satellite: WO-18
Catalog number: 20441
Epoch time: 93334.21540152
Element set: 716
Inclination: 98.6128 deg
RA of node: 57.8916 deg
Eccentricity: 0.0012863
Arg of perigee: 57.2334 deg
Mean anomaly: 303.0100 deg
Mean motion: 14.29978366 rev/day
Decay rate: 6.0e-07 rev/day^2
Epoch rev: 20118
Checksum: 281

Satellite: LO-19
Catalog number: 20442
Epoch time: 93334.69648230
Element set: 715
Inclination: 98.6137 deg
RA of node: 58.5780 deg
Eccentricity: 0.0013153
Arg of perigee: 55.4957 deg
Mean anomaly: 304.7459 deg
Mean motion: 14.30070867 rev/day
Decay rate: 5.5e-07 rev/day^2
Epoch rev: 20126
Checksum: 310

Satellite: UO-22
Catalog number: 21575
Epoch time: 93334.67727514
Element set: 415
Inclination: 98.4566 deg
RA of node: 47.9847 deg
Eccentricity: 0.0007826
Arg of perigee: 156.5425 deg
Mean anomaly: 203.6132 deg
Mean motion: 14.36868808 rev/day
Decay rate: 8.6e-07 rev/day^2
Epoch rev: 12457
Checksum: 336

Satellite: KO-23
Catalog number: 22077
Epoch time: 93335.44100612

Element set: 312
Inclination: 66.0879 deg
RA of node: 334.0117 deg
Eccentricity: 0.0005948
Arg of perigee: 336.7167 deg
Mean anomaly: 23.3555 deg
Mean motion: 12.86282019 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 6135
Checksum: 264

Satellite: AO-27
Catalog number: 22825
Epoch time: 93335.66121621
Element set: 214
Inclination: 98.6748 deg
RA of node: 48.2617 deg
Eccentricity: 0.0009506
Arg of perigee: 67.0884 deg
Mean anomaly: 293.1315 deg
Mean motion: 14.27592650 rev/day
Decay rate: 5.4e-07 rev/day^2
Epoch rev: 950
Checksum: 305

Satellite: IO-26
Catalog number: 22826
Epoch time: 93335.65645330
Element set: 215
Inclination: 98.6753 deg
RA of node: 48.2666 deg
Eccentricity: 0.0010130
Arg of perigee: 68.0262 deg
Mean anomaly: 292.2022 deg
Mean motion: 14.27695161 rev/day
Decay rate: 6.7e-07 rev/day^2
Epoch rev: 950
Checksum: 289

Satellite: KO-25
Catalog number: 22830
Epoch time: 93334.73062882
Element set: 215
Inclination: 98.5750 deg
RA of node: 46.7010 deg
Eccentricity: 0.0012513
Arg of perigee: 41.6119 deg
Mean anomaly: 318.6010 deg
Mean motion: 14.28019103 rev/day
Decay rate: 6.3e-07 rev/day^2
Epoch rev: 937

```
Checksum: 261

/EX
```

396. ORBS$337.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:05:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-337.w.1993@ampr.org>
Source record: 28455
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-337.W
Orbital Elements 337.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX December 3, 1993
BID: $ORBS-337.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93334.84368432
Element set: 615
Inclination: 99.0804 deg
RA of node: 17.7293 deg
Eccentricity: 0.0015863
Arg of perigee: 60.2936 deg
Mean anomaly: 299.9797 deg
Mean motion: 14.13566417 rev/day
Decay rate: 1.30e-06 rev/day^2
Epoch rev: 46232
Checksum: 329

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93333.79766137
Element set: 513
Inclination: 98.5132 deg
RA of node: 343.8701 deg
Eccentricity: 0.0012893
Arg of perigee: 187.6835 deg
Mean anomaly: 172.3786 deg
Mean motion: 14.24846717 rev/day
Decay rate: 8.2e-07 rev/day^2
Epoch rev: 37421
Checksum: 339

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93334.74597958
Element set: 214
Inclination: 82.5442 deg
RA of node: 66.4440 deg
Eccentricity: 0.0017282
Arg of perigee: 23.3483 deg
```

Mean anomaly: 336.8433 deg
Mean motion: 13.84698976 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 29489
Checksum: 348

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93327.88606867
Element set: 213
Inclination: 82.5382 deg
RA of node: 108.9623 deg
Eccentricity: 0.0018510
Arg of perigee: 57.6406 deg
Mean anomaly: 302.6575 deg
Mean motion: 13.16961911 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25623
Checksum: 308

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93335.92967935
Element set: 413
Inclination: 99.1530 deg
RA of node: 315.2247 deg
Eccentricity: 0.0011726
Arg of perigee: 331.7228 deg
Mean anomaly: 28.3309 deg
Mean motion: 14.12936228 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 26735
Checksum: 302

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93332.43866979
Element set: 214
Inclination: 82.5176 deg
RA of node: 303.9647 deg
Eccentricity: 0.0016035
Arg of perigee: 71.1943 deg
Mean anomaly: 289.1041 deg
Mean motion: 13.84349840 rev/day
Decay rate: 2.8e-07 rev/day^2
Epoch rev: 23991
Checksum: 329

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93334.69005237

Element set: 917
Inclination: 82.5555 deg
RA of node: 47.4111 deg
Eccentricity: 0.0016898
Arg of perigee: 62.3849 deg
Mean anomaly: 297.9388 deg
Mean motion: 13.16025158 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19700
Checksum: 312

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93335.60399146
Element set: 715
Inclination: 82.5472 deg
RA of node: 5.4152 deg
Eccentricity: 0.0015768
Arg of perigee: 346.9929 deg
Mean anomaly: 13.0856 deg
Mean motion: 13.84183560 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17328
Checksum: 315

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93339.47904126
Element set: 821
Inclination: 98.8533 deg
RA of node: 0.7053 deg
Eccentricity: 0.0014839
Arg of perigee: 188.6689 deg
Mean anomaly: 174.3362 deg
Mean motion: 14.01384510 rev/day
Decay rate: 6.89e-06 rev/day^2
Epoch rev: 16657
Checksum: 332

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93335.37726470
Element set: 714
Inclination: 82.5244 deg
RA of node: 303.3602 deg
Eccentricity: 0.0011729
Arg of perigee: 242.0794 deg
Mean anomaly: 117.9159 deg
Mean motion: 13.83565277 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 16040

Checksum: 296

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93334.42659185
Element set: 619
Inclination: 82.5452 deg
RA of node: 310.1141 deg
Eccentricity: 0.0012716
Arg of perigee: 324.1743 deg
Mean anomaly: 35.9155 deg
Mean motion: 13.16458468 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12520
Checksum: 275

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93335.94780045
Element set: 820
Inclination: 98.6410 deg
RA of node: 2.8806 deg
Eccentricity: 0.0013991
Arg of perigee: 87.7504 deg
Mean anomaly: 272.5281 deg
Mean motion: 14.22339524 rev/day
Decay rate: 1.89e-06 rev/day^2
Epoch rev: 13249
Checksum: 302

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93335.73681315
Element set: 616
Inclination: 82.5541 deg
RA of node: 256.1756 deg
Eccentricity: 0.0013519
Arg of perigee: 337.2586 deg
Mean anomaly: 22.7976 deg
Mean motion: 13.16824449 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11047
Checksum: 313

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93330.57841316
Element set: 213
Inclination: 82.5498 deg
RA of node: 6.9986 deg
Eccentricity: 0.0023854

```
Arg of perigee: 74.2891 deg
Mean anomaly: 286.0902 deg
Mean motion: 13.82992608 rev/day
Decay rate: 5.2e-07 rev/day^2
Epoch rev: 1208
Checksum: 316

/EX
```

397. ORBS$337.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:07:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-337.m.1993@ampr.org>
Source record: 28456
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-337.M
Orbital Elements 337.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX December 3, 1993
BID: $ORBS-337.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93335.61195375
Element set: 8
Inclination: 51.6183 deg
RA of node: 98.3478 deg
Eccentricity: 0.0005473
Arg of perigee: 48.6088 deg
Mean anomaly: 311.5306 deg
Mean motion: 15.58761518 rev/day
Decay rate: 6.745e-05 rev/day^2
Epoch rev: 44522
Checksum: 319

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93334.49424048
Element set: 366
Inclination: 28.4678 deg
RA of node: 72.2793 deg
Eccentricity: 0.0004404
Arg of perigee: 354.4743 deg
Mean anomaly: 5.5823 deg
Mean motion: 14.92940966 rev/day
Decay rate: 7.37e-06 rev/day^2
Epoch rev: 19638
Checksum: 320

Satellite: GRO
Catalog number: 21225
Epoch time: 93332.89291156
Element set: 1
Inclination: 28.4615 deg
RA of node: 182.5452 deg
Eccentricity: 0.0032650
Arg of perigee: 186.4473 deg
```

```
Mean anomaly: 173.5288 deg
Mean motion: 15.46654112 rev/day
Decay rate: 4.723e-05 rev/day^2
Epoch rev: 2600
Checksum: 277

Satellite: UARS
Catalog number: 21701
Epoch time: 93332.63061551
Element set: 416
Inclination: 56.9840 deg
RA of node: 242.6493 deg
Eccentricity: 0.0005839
Arg of perigee: 92.2745 deg
Mean anomaly: 267.9904 deg
Mean motion: 14.96170835 rev/day
Decay rate: 4.494e-05 rev/day^2
Epoch rev: 12090
Checksum: 307

Satellite: POSAT
Catalog number: 22829
Epoch time: 93289.11726978
Element set: 204
Inclination: 98.6763 deg
RA of node: 2.0610 deg
Eccentricity: 0.0010043
Arg of perigee: 184.4594 deg
Mean anomaly: 175.6498 deg
Mean motion: 14.27975951 rev/day
Decay rate: 7.2e-07 rev/day^2
Epoch rev: 286
Checksum: 317

/EX
```

398. ORBS$337.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:09:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-337.n.1993@ampr.org>
Source record: 28457
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-337.N
2Line Orbital Elements 337.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX December 3, 1993
BID: $ORBS-337.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93328.37358304 .00000006 00000-0 10000-3 0 2127
2 14129 27.1967 354.6814 6020029 132.8205 296.5509 2.05877703 78552
UO-11
1 14781U 84021B 93334.56060295 .00000200 00000-0 37883-4 0 6151
2 14781 97.7956 353.4973 0011482 179.8391 180.2820 14.69091713521149
RS-10/11
1 18129U 87054A 93332.42270253 .00000059 00000-0 57861-4 0 8141
2 18129 82.9259 117.2417 0010740 217.0444 143.0089 13.72327034322379
AO-13
1 19216U 88051B 93334.89295688 -.00000293 00000-0 10000-4 0 8199
2 19216 57.9062 281.3321 7211239 329.5060 3.4438 2.09727727 41853
FO-20
1 20480U 90013C 93330.50118171 -.00000019 00000-0 -16586-4 0 6112
2 20480 99.0189 155.8314 0541157 78.7761 287.3633 12.83222138178132
AO-21
1 21087U 91006A 93334.52703634 .00000084 00000-0 82657-4 0 3725
2 21087 82.9438 289.7212 0034068 279.0086 80.7210 13.74529132142291
RS-12/13
1 21089U 91007A 93335.60629654 .00000062 00000-0 59526-4 0 6163
2 21089 82.9186 157.9722 0028484 300.8203 59.0141 13.74031015141507
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
UO-14
1 20437U 90005B 93334.69642848 .00000066 00000-0 33274-4 0 9152
2 20437 98.6046 57.0601 0011889 55.3459 304.8840 14.29806558201220
AO-16
1 20439U 90005D 93334.68970974 .00000056 00000-0 29505-4 0 7156
```

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2 20439 98.6123 58.0868 0012249 55.8918 304.3434 14.29863405201239
DO-17
1 20440U 90005E 93334.66327841 .00000062 00000-0 31771-4 0 7150
2 20440 98.6134 58.3203 0012311 55.5998 304.6342 14.30000807201247
WO-18
1 20441U 90005F 93334.21540152 .00000060 00000-0 31195-4 0 7163
2 20441 98.6128 57.8916 0012863 57.2334 303.0100 14.29978366201181
LO-19
1 20442U 90005G 93334.69648230 .00000055 00000-0 29004-4 0 7151
2 20442 98.6137 58.5780 0013153 55.4957 304.7459 14.30070867201268
UO-22
1 21575U 91050B 93334.67727514 .00000086 00000-0 36002-4 0 4158
2 21575 98.4566 47.9847 0007826 156.5425 203.6132 14.36868808124578
KO-23
1 22077U 92052B 93335.44100612 .00000000 00000-0 10000-3 0 3120
2 22077 66.0879 334.0117 0005948 336.7167 23.3555 12.86282019 61351
AO-27
1 22825U 93061C 93335.66121621 .00000054 00000-0 30201-4 0 2145
2 22825 98.6748 48.2617 0009506 67.0884 293.1315 14.27592650 9503
IO-26
1 22826U 93061D 93335.65645330 .00000067 00000-0 35056-4 0 2151
2 22826 98.6753 48.2666 0010130 68.0262 292.2022 14.27695161 9506
KO-25
1 22830U 93061H 93334.73062882 .00000063 00000-0 33395-4 0 2159
2 22830 98.5750 46.7010 0012513 41.6119 318.6010 14.28019103 9370
NOAA-9
1 15427U 84123A 93334.84368432 .00000130 00000-0 79180-4 0 6155
2 15427 99.0804 17.7293 0015863 60.2936 299.9797 14.13566417462326
NOAA-10
1 16969U 86073A 93333.79766137 .00000082 00000-0 43108-4 0 5134
2 16969 98.5132 343.8701 0012893 187.6835 172.3786 14.24846717374213
MET-2/17
1 18820U 88005A 93334.74597958 .00000046 00000-0 35403-4 0 2145
2 18820 82.5442 66.4440 0017282 23.3483 336.8433 13.84698976294896
MET-3/2
1 19336U 88064A 93327.88606867 .00000043 00000-0 10000-3 0 2131
2 19336 82.5382 108.9623 0018510 57.6406 302.6575 13.16961911256238
NOAA-11
1 19531U 88089A 93335.92967935 .00000081 00000-0 53930-4 0 4139
2 19531 99.1530 315.2247 0011726 331.7228 28.3309 14.12936228267351
MET-2/18
1 19851U 89018A 93332.43866979 .00000028 00000-0 20155-4 0 2149
2 19851 82.5176 303.9647 0016035 71.1943 289.1041 13.84349840239910
MET-3/3
1 20305U 89086A 93334.69005237 .00000043 00000-0 10000-3 0 9176
2 20305 82.5555 47.4111 0016898 62.3849 297.9388 13.16025158197009
MET-2/19
1 20670U 90057A 93335.60399146 .00000015 00000-0 79036-5 0 7159
2 20670 82.5472 5.4152 0015768 346.9929 13.0856 13.84183560173284
FY-1/2
```

```
1 20788U 90081A 93339.47904126 .00000689 00000-0 47919-3 0 8213
2 20788 98.8533 0.7053 0014839 188.6689 174.3362 14.01384510166577
MET-2/20
1 20826U 90086A 93335.37726470 .00000056 00000-0 45487-4 0 7148
2 20826 82.5244 303.3602 0011729 242.0794 117.9159 13.83565277160401
MET-3/4
1 21232U 91030A 93334.42659185 .00000043 00000-0 10000-3 0 6195
2 21232 82.5452 310.1141 0012716 324.1743 35.9155 13.16458468125204
NOAA-12
1 21263U 91032A 93335.94780045 .00000189 00000-0 93586-4 0 8205
2 21263 98.6410 2.8806 0013991 87.7504 272.5281 14.22339524132493
MET-3/5
1 21655U 91056A 93335.73681315 .00000043 00000-0 10000-3 0 6164
2 21655 82.5541 256.1756 0013519 337.2586 22.7976 13.16824449110479
MET-2/21
1 22782U 93055A 93330.57841316 .00000052 00000-0 42172-4 0 2132
2 22782 82.5498 6.9986 0023854 74.2891 286.0902 13.82992608 12086
MIR
1 16609U 86017A 93335.61195375 .00006745 00000-0 88822-4 0 89
2 16609 51.6183 98.3478 0005473 48.6088 311.5306 15.58761518445223
HUBBLE
1 20580U 90037B 93334.49424048 .00000737 00000-0 62150-4 0 3664
2 20580 28.4678 72.2793 0004404 354.4743 5.5823 14.92940966196384
GRO
1 21225U 91027B 93332.89291156 .00004723 00000-0 86749-4 0 10
2 21225 28.4615 182.5452 0032650 186.4473 173.5288 15.46654112 26003
UARS
1 21701U 91063B 93332.63061551 .00004494 00000-0 41654-3 0 4165
2 21701 56.9840 242.6493 0005839 92.2745 267.9904 14.96170835120902
POSAT
1 22829U 93 61 G 93289.11726978 .00000072 00000-0 37231-4 0 2042
2 22829 98.6763 2.0610 0010043 184.4594 175.6498 14.27975951 2862
/EX
```

399. STS-61 Orbital Elements

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 15:39:40 UTC
From: at017@cleveland.Freenet.Edu
Message-ID: <2dnmjs$olk@usenet.INS.CWRU.Edu>
Source record: 28458

Does anyone have the two line orbital elements for the space shuttle?
--
Ronald Wolenski at017@cleveland.freenet.edu
N8WCR
Parma, Ohio

400. * SpaceNews 06-Dec-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-12-03 18:56:41 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1206.1993@ampr.org>
Source record: 28459
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1206
* SpaceNews 06-Dec-93 *

BID: $SPC1206

=========
SpaceNews
=========

MONDAY DECEMBER 6, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* HUBBLE REPAIR NEWS *
======================
STS-61 lifted off at the opening of its launch window at 4:27 AM EST (9:27 UTC) on 02-Dec-93. Ascent to orbit was nominal in every respect. Flight controllers on duty in the Space Telescope Operations Control Center let out a little cheer at the moment of liftoff and a great big one when the solid rocket boosters seperated two minutes later. Because of the lighter than normal payload, the single engine press to ATO (abort to orbit) call occurred before the negative return call, thus the Transatlantic Abort Option (TAL) was not needed to cover single engine failure contingencies. Because of the unusually high altitude of this mission, Endeavour will have only enough fuel for one rendezvous attempt, in order to keep enough fuel in reserve to execute the de-orbit burn at the end of the mission.

One of the service mission activities planned for the 4th EVA will be the installation of a 80386 co-processor on the DF-244 computer. The DF-224, built by Rockwell Autonetics, is a general purpose digital computer which is the main computer onboard HST, and is responsible for executing stored command loads, formatting data for telemetry to the Space Telescope Operations Control Center, and keeping the solar arrays pointing at the sun and the high gain antennas pointing at the Tracking and Data Relay satellites. The DF-224 is a 24 bit computer with three central processing units, one prime and two backups, six memory units of 48K words each, and three I/O units, two as backup. Since HST was launched, two of the six memory modules have failed, leaving four memory units to support HST operations. The HST requires a minimium of three working memory units, but is currently making use of all four memory units. Failure of another memory would impact HST operations and would require more frequent command load uplinks than are desirable. The Solar Array Gain Augmentation software (SAGA), which

was developed shortly after HST was launched in order to counteract the vibration of the HST solar arrays, also occupies part of the DF-224 memory and could not be run if another memory module were to fail.

Immediately following the co-processor installation, a pre-planned aliveness and functional test will be performed by ground command in order to verify that the co-processor's shared memory is working and properly communicating with the DF-224. If the test indicates that neither side of the co-processor works with the current DF-224, and there is no cable problem, the astronauts will install a spare DF-224 which they are carrying onboard in case it is needed. This would require a sixth contingency EVA in addition to the five that are baselined for STS-61.

The Goddard High Resolution Spectrograph, one of the four axial science instruments, suffered an intermittent failure of its A-side power supply in 1991. There is a redundant B-side power supply available, but unlike other parts of the HST, the redundant B-side of each of the science instruments is not just a spare to be used in case of failure in the A-side, but is used regularly in its own right because its digicon detector has different spectral characteristics from the A-side detector. The choice of which side of the GHRS to use is determined by which of the two detectors is best suited to the desired astronomical observation. In the case of the GHRS, data from both sides of the instrument flows through a science data interface circuit which receives its power from the A-side power supply and is then routed to the A-side of the Science Data Formatter (SDF) for transmission to the ground. The intermittent failure of the A-side power supply leaves the A-side detector out of commission, and threatens the ability of the B-side detector to send its science data to the ground via the A-side of the SDF. There is a second interface circuit powered from the functional B-side power supply, which feeds data to the B-side of the SDF, but this data path cannot be used unless the science instrument command and data handling system (SIC&DH) is reconfigured to the redundant B-side, a drastic action that HST flight controllers are reluctant to take just to salvage one science instrument.

[Info via Dan Schultz, N8FGV, Space Telescope Operations Control Center, Goddard Space Flight Center, Greenbelt, MD (schultz@cddis.gsfc.nasa.gov)]

* STS-61 KEPS *
==========
STS-61
1 22917U 93075A 93337.30642863 0.00000095 00000-0 00000+0 0 55
2 22917 28.4704 54.2074 0043739 56.8805 303.5973 15.08705500 155

Satellite: STS-61
Catalog number: 22917
Epoch time: 93337.30642863 (03 DEC 93 07:21:15.43 UTC)
Element set: GSFC-005
Inclination: 28.4704 deg
RA of node: 54.2074 deg Space Shuttle Flight STS-61
Eccentricity: 0.0043739 Keplerian Elements

Arg of perigee: 56.8805 deg
Mean anomaly: 303.5973 deg
Mean motion: 15.08705500 rev/day Semi-major Axis: 6918.2866 Km
Decay rate: 0.95E-06 rev/day^2 Apogee Alt: 570.16 Km
Epoch rev: 15 Perigee Alt: 509.64 Km

NOTE - This element set is based on NORAD element set # 005.
The spacecraft has been propagated to the next ascending
node, and the orbit number has been adjusted to bring it
into agreement with the NASA numbering convention.

[Info via Ron Parise, WA4SIR, at the Goddard Space Flight Center]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

Richard Keen Kip Kippley Bob Kirby

* FEEDBACK/INPUT WELCOMED *
==========================
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
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401. Two-Line Orbital Element Sets (TLE303)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-04 00:56:20 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.754966580@afit.af.mil>
Source record: 28513
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #303 -
Alouette 1
1 00424U 62049 93333.87152356 .00000080 00000-0 89793-4 0 9166
2 00424 80.4643 121.6549 0022567 268.1437 91.7123 13.67789336555155
ATS 3
1 03029U 67111A 93321.53482604 -.00000081 00000-0 10000-3 0 1109
2 03029 14.5003 9.6434 0020712 241.4098 252.8976 1.00278883 95319
Cosmos 398
1 04966U 71016A 93337.16429823 .00139758 31414-4 34055-3 0 8214
2 04966 51.4586 354.4812 1217621 162.0337 202.9173 13.43340686745957
Starlette
1 07646U 75010A 93331.72031049 -.00000054 00000-0 58386-5 0 7130
2 07646 49.8235 228.3700 0205709 30.8786 330.3996 13.82184712949982
LAGEOS
1 08820U 76039A 93332.66866793 -.00000001 00000-0 10000-3 0 9169
2 08820 109.8568 66.9052 0044174 328.1089 31.6941 6.38664564154345
ETS-2
1 09852U 77014A 93325.39294639 .00000069 00000-0 10000-3 0 9090
2 09852 11.7748 44.0376 0003389 22.0749 324.8312 1.00018145 8578
GOES 2
1 10061U 77048A 93335.57718771 .00000112 00000-0 10000-3 0 2238
2 10061 10.8301 48.1072 0002566 27.4284 66.6107 1.00272845 5135
IUE
1 10637U 78012A 93336.22381283 -.00000191 00000-0 10000-3 0 9196
2 10637 34.2921 98.1064 1306675 30.0310 333.4970 1.00267177 10745
GPS BI-01
1 10684U 78020A 93331.28584089 -.00000018 00000-0 10000-3 0 2086
2 10684 64.5290 51.5256 0063341 160.4996 199.7730 1.98079346100928
GPS BI-02
1 10893U 78047A 93322.46872453 -.00000016 00000-0 10000-3 0 2079
```

```
2 10893 63.6507 291.1572 0209861 13.6317 346.9160 2.01627566113823
GOES 3
1 10953U 78062A 93332.62473571 .00000113 00000-0 10000-3 0 2178
2 10953 9.7565 50.9550 0006555 120.0753 308.3904 1.00259886 9718
SeaSat 1
1 10967U 78064A 93333.87680633 .00000120 00000-0 60715-4 0 2157
2 10967 108.0027 49.7423 0002924 256.5180 103.5664 14.37895031807715
GPS BI-03
1 11054U 78093A 93327.56837976 -.00000017 00000-0 10000-3 0 1112
2 11054 63.3520 287.8029 0043224 175.3967 184.6393 1.93505112110532
Nimbus 7
1 11080U 78098A 93329.69415197 .00000008 00000-0 22886-4 0 3194
2 11080 99.0751 215.6064 0008810 323.5300 36.5241 13.83724404761933
GPS BI-04
1 11141U 78112A 93327.54904045 -.00000019 00000-0 10000-3 0 8109
2 11141 64.7945 52.5890 0427415 12.3142 348.5200 1.81912022109031
GPS BI-05
1 11690U 80011A 93332.46740469 -.00000017 00000-0 10000-3 0 7123
2 11690 64.8797 53.3367 0142214 198.1764 161.3495 2.00552800115511
GPS BI-06
1 11783U 80032A 93327.05617827 -.00000016 00000-0 10000-3 0 9119
2 11783 62.7653 285.1393 0204315 30.1095 331.0481 2.03455482 99769
GOES 5
1 12472U 81049A 93334.55507094 .00000131 00000-0 10000-3 0 7071
2 12472 6.4074 60.3248 0004220 0.0229 70.9428 1.00241583 3774
Cosmos 1383
1 13301U 82066A 93336.87599280 .00000017 00000-0 13079-4 0 2166
2 13301 82.9319 93.6972 0026370 277.0009 82.8164 13.68047112570577
LandSat 4
1 13367U 82072A 93335.15740233 .00000022 00000-0 10000-4 0 3866
2 13367 98.2098 31.9713 0007379 142.1142 218.0695 14.57105386605218
IRAS
1 13777U 83004A 93334.54981152 .00000178 00000-0 14640-3 0 5201
2 13777 98.9740 164.5806 0012585 136.5778 223.6382 13.99193892223368
Cosmos 1447
1 13916U 83021A 93333.56347798 .00000059 00000-0 56045-4 0 3154
2 13916 82.9435 159.3361 0036787 224.8253 134.9973 13.74298790535917
TDRS 1
1 13969U 83026B 93333.63137282 .00000127 00000-0 10000-3 0 2245
2 13969 7.3096 53.2088 0000662 289.1010 142.5556 1.00271685 12052
GOES 6
1 14050U 83041A 93331.49488524 -.00000198 00000-0 10000-3 0 1163
2 14050 5.1911 63.2959 0002910 315.1610 146.6156 1.00243583 10761
OSCAR 10
1 14129U 83058B 93328.37358304 .00000006 00000-0 10000-3 0 2127
2 14129 27.1967 354.6814 6020029 132.8205 296.5509 2.05877703 50585
LandSat 5
1 14780U 84021A 93334.92158471 .00000100 00000-0 27106-4 0 9849
2 14780 98.1936 33.3396 0005207 143.9970 216.1566 14.57114416518603
UoSat 2
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```
1 14781U 84021B 93334.56060295 .00000200 00000-0 37883-4 0 6151
2 14781 97.7956 353.4973 0011482 179.8391 180.2820 14.69091713521149
GPS BI-09
1 15039U 84059A 93334.29150386 -.00000017 00000-0 10000-3 0 1186
2 15039 63.8497 47.2808 0055599 217.5360 142.1278 2.00561654 69349
Cosmos 1574
1 15055U 84062A 93333.70233117 .00000025 00000-0 20314-4 0 5156
2 15055 82.9591 212.1458 0028963 52.8991 307.4817 13.73595756473248
GPS BI-10
1 15271U 84097A 93332.22785499 -.00000020 00000-0 10000-3 0 7210
2 15271 62.4722 284.8798 0140579 345.9230 13.6727 2.00575409 66414
Cosmos 1602
1 15331U 84105A 93333.83322311 .00000439 00000-0 50842-4 0 2144
2 15331 82.5358 264.3472 0021156 136.9616 223.3227 14.84197950494940
NOAA 9
1 15427U 84123A 93339.44453018 .00000139 00000-0 84207-4 0 6134
2 15427 99.0789 22.3963 0015814 48.6545 311.6355 14.13568019462979
GPS BI-11
1 16129U 85093A 93335.45515869 -.00000014 00000-0 10000-3 0 5165
2 16129 64.5961 49.2835 0131564 141.6548 219.3432 2.00563837 6196
Mir
1 16609U 86017A 93336.31717093 .00019897 00000-0 25845-3 0 104
2 16609 51.6174 94.8137 0005668 49.1420 311.0252 15.58790642445335
SPOT 1
1 16613U 86019A 93336.48647434 .00000114 00000-0 62356-4 0 5803
2 16613 98.7134 48.4371 0001069 73.0323 287.0970 14.20041086 88636
Cosmos 1766
1 16881U 86055A 93334.90448573 .00000445 00000-0 52860-4 0 1147
2 16881 82.5156 321.4488 0019736 155.1707 205.0463 14.83232100396063
EGP
1 16908U 86061A 93334.46182692 -.00000025 00000-0 10000-3 0 8143
2 16908 50.0118 335.3577 0011522 168.0680 192.0417 12.44408382332013
NOAA 10
1 16969U 86073A 93333.79766137 .00000082 00000-0 43108-4 0 5134
2 16969 98.5132 343.8701 0012893 187.6835 172.3786 14.24846717374213
MOS-1
1 17527U 87018A 93335.51447873 .00000134 00000-0 12493-3 0 9808
2 17527 99.0604 43.1290 0001421 87.4976 272.6337 13.94893230345374
GOES 7
1 17561U 87022A 93335.36261120 -.00000010 00000-0 10000-3 0 6233
2 17561 1.1167 78.0652 0002278 352.8992 17.5970 1.00268556 7990
Kvant-1
1 17845U 87030A 93335.86838634 .00013034 00000-0 17181-3 0 6520
2 17845 51.6188 97.0649 0005280 40.6029 319.4826 15.58772556445330
DMSP B5D2-3
1 18123U 87053A 93333.08872997 .00000163 00000-0 93170-4 0 1355
2 18123 98.7864 162.7020 0014904 33.6220 326.5890 14.15319978332707
RS-10/11
1 18129U 87054A 93332.42270253 .00000059 00000-0 57861-4 0 8141
2 18129 82.9259 117.2417 0010740 217.0444 143.0089 13.72327034322379
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Meteor 2-16
1 18312U 87068A 93334.56701089 .00000044 00000-0 33903-4 0 2153
2 18312 82.5584 9.3908 0011374 315.9496 44.0777 13.84014855317583
Meteor 2-17
1 18820U 88005A 93334.74597958 .00000046 00000-0 35403-4 0 2145
2 18820 82.5442 66.4440 0017282 23.3483 336.8433 13.84698976294896
DMSP B5D2-4
1 18822U 88006A 93333.07984342 .00000050 00000-0 30232-4 0 2397
2 18822 98.4634 191.0445 0005914 201.9077 158.1878 14.22901683302061
Glonass 34
1 19163U 88043A 93336.33089936 .00000014 00000-0 10000-3 0 8143
2 19163 64.9610 117.0361 0007738 168.4581 191.5450 2.13101737 42461
Glonass 36
1 19165U 88043C 93335.44816905 .00000014 00000-0 10000-3 0 2098
2 19165 64.9777 117.0644 0003826 331.0847 28.8724 2.13102329 43069
METEOSAT 3
1 19215U 88051A 93334.40185263 -.00000219 00000-0 10000-3 0 8166
2 19215 1.2930 74.0705 0003727 223.7899 201.7807 1.00263363 7913
AO-13
1 19216U 88051B 93335.84660375 -.00000229 00000-0 10000-4 0 8205
2 19216 57.9029 281.1629 7211005 329.5804 3.4589 2.09726084 10377
OKEAN 1
1 19274U 88056A 93334.71621195 .00000429 00000-0 52464-4 0 8140
2 19274 82.5152 61.3267 0018873 306.7669 53.1829 14.82017922291687
Meteor 3-2
1 19336U 88064A 93336.85079613 .00000043 00000-0 10000-3 0 2153
2 19336 82.5425 102.6231 0017568 36.2879 323.9520 13.16962192257410
Glonass 39
1 19503U 88085C 93331.24960101 -.00000013 00000-0 10000-3 0 1103
2 19503 65.7615 356.1274 0006739 183.8393 176.2438 2.13102312 40468
NOAA 11
1 19531U 88089A 93335.92967935 .00000081 00000-0 53930-4 0 4139
2 19531 99.1530 315.2247 0011726 331.7228 28.3309 14.12936228267351
TDRS 2
1 19548U 88091B 93334.22701931 -.00000249 00000-0 10000-3 0 8225
2 19548 0.5797 78.8051 0003150 157.0046 213.2367 1.00268868 6210
Glonass 40
1 19749U 89001A 93335.51277134 .00000014 00000-0 10000-3 0 3185
2 19749 64.9421 116.6624 0004372 262.5161 97.3951 2.13101219 38075
Glonass 41
1 19750U 89001B 93330.40779916 .00000021 00000-0 10000-3 0 2092
2 19750 64.9601 116.8818 0006946 248.9651 110.9540 2.13101996 37960
GPS BII-01
1 19802U 89013A 93334.29676950 .00000031 00000-0 10000-3 0 8152
2 19802 55.0864 147.6062 0035554 173.6083 186.4546 2.00568706 35057
Akebono
1 19822U 89016A 93336.67268363 .00015159 00000-0 91525-3 0 1360
2 19822 75.0891 292.9380 3842630 74.5429 324.0620 7.72857166 94047
Meteor 2-18
1 19851U 89018A 93332.43866979 .00000028 00000-0 20155-4 0 2149
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2 19851 82.5176 303.9647 0016035 71.1943 289.1041 13.84349840239910
MOP-1
1 19876U 89020B 93334.35046441 .00000030 00000-0 10000-3 0 7163
2 19876 0.1242 345.9940 0000290 243.0997 326.7129 1.00265989 5084
TDRS 3
1 19883U 89021B 93333.44846295 -.00000231 00000-0 00000+0 0 8199
2 19883 0.0381 67.4361 0002078 192.0432 289.2464 1.00267363 87466
GPS BII-02
1 20061U 89044A 93332.14516076 -.00000027 00000-0 10000-3 0 8199
2 20061 54.7434 324.6511 0125657 205.1948 154.2040 2.00566356 32751
Nadezhda 1
1 20103U 89050A 93336.80476952 .00000011 00000-0 49648-5 0 9171
2 20103 82.9595 72.5889 0038869 115.4604 245.0573 13.73828948221341
GPS BII-03
1 20185U 89064A 93332.48076337 .00000033 00000-0 10000-3 0 8204
2 20185 54.9052 148.3208 0006763 229.7976 130.1586 2.00551285 31335
GMS 4
1 20217U 89070A 93335.32373039 -.00000251 00000-0 10000-3 0 9251
2 20217 0.1140 82.8786 0001138 260.0118 343.7766 1.00263005 16101
GPS BII-04
1 20302U 89085A 93332.51343318 -.00000017 00000-0 10000-3 0 8212
2 20302 53.6613 265.1445 0066119 36.6072 322.7140 2.00562131 30133
Meteor 3-3
1 20305U 89086A 93334.69005237 .00000043 00000-0 10000-3 0 9176
2 20305 82.5555 47.4111 0016898 62.3849 297.9388 13.16025158197009
COBE
1 20322U 89089A 93332.58516251 -.00000024 00000-0 -43204-5 0 9149
2 20322 98.9861 346.2691 0009782 106.8555 253.3590 14.03425110206252
Kvant-2
1 20335U 89093A 93335.86838634 .00013034 00000-0 17181-3 0 7452
2 20335 51.6188 97.0649 0005280 40.6029 319.4826 15.58772556445282
GPS BII-05
1 20361U 89097A 93333.51637343 -.00000007 00000-0 10000-3 0 7167
2 20361 55.4191 90.2335 0071877 103.6162 257.1625 2.00567122 19643
SPOT 2
1 20436U 90005A 93335.46834185 .00000120 00000-0 65161-4 0 6859
2 20436 98.6892 47.6798 0001610 73.5559 286.5788 14.20045309200028
UO-14
1 20437U 90005B 93334.69642848 .00000066 00000-0 33274-4 0 9152
2 20437 98.6046 57.0601 0011889 55.3459 304.8840 14.29806558201220
UO-15
1 20438U 90005C 93333.70064786 .00000034 00000-0 21080-4 0 7158
2 20438 98.6050 55.2633 0011018 60.1196 300.1091 14.29152280201017
PACSAT
1 20439U 90005D 93334.68970974 .00000056 00000-0 29505-4 0 7156
2 20439 98.6123 58.0868 0012249 55.8918 304.3434 14.29863405201239
DO-17
1 20440U 90005E 93334.66327841 .00000062 00000-0 31771-4 0 7150
2 20440 98.6134 58.3203 0012311 55.5998 304.6342 14.30000807201247
WO-18
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1 20441U 90005F 93334.21540152 .00000060 00000-0 31195-4 0 7163
2 20441 98.6128 57.8916 0012863 57.2334 303.0100 14.29978366201181
LO-19
1 20442U 90005G 93334.69648230 .00000055 00000-0 29004-4 0 7151
2 20442 98.6137 58.5780 0013153 55.4957 304.7459 14.30070867201268
GPS BII-06
1 20452U 90008A 93334.42117911 .00000027 00000-0 10000-3 0 8192
2 20452 54.0747 204.6125 0053373 71.7658 288.9179 2.00566415 28156
MOS-1B
1 20478U 90013A 93336.13349816 .00000117 00000-0 10000-3 0 5239
2 20478 99.0591 47.8576 0001000 105.4610 254.6112 13.94886612115175
DEBUT
1 20479U 90013B 93335.52653208 -.00000003 00000-0 19643-4 0 7123
2 20479 99.0170 159.9779 0541022 67.1938 298.5417 12.83310420178775
FO-20
1 20480U 90013C 93330.50118171 -.00000019 00000-0 -16586-4 0 6112
2 20480 99.0189 155.8314 0541157 78.7761 287.3633 12.83222138178132
MOS-1B R/B
1 20491U 90013D 93334.65170858 -.00000816 00000-0 -15093-2 0 9178
2 20491 99.0350 198.6448 0470369 313.2026 43.0653 13.02970525180802
LACE
1 20496U 90015A 93332.69642669 .00002932 00000-0 97958-4 0 3187
2 20496 43.1000 107.6259 0011887 156.4854 203.6052 15.31722255210755
Nadezhda 2
1 20508U 90017A 93332.68701762 .00000027 00000-0 22336-4 0 9156
2 20508 82.9555 210.2887 0046037 78.1553 282.4747 13.73463756188026
OKEAN 2
1 20510U 90018A 93334.58639620 .00000292 00000-0 38619-4 0 2152
2 20510 82.5257 9.2775 0020516 116.1941 244.1398 14.78189343202324
INTELSAT-6
1 20523U 90021A 93334.13477726 -.00000206 00000-0 20000-3 0 3182
2 20523 0.0081 38.7870 0000538 223.4657 180.7738 1.00268993 6616
GPS BII-07
1 20533U 90025A 93335.82446866 -.00000028 00000-0 10000-3 0 8170
2 20533 55.0805 324.9597 0040088 84.0752 276.3842 2.00564142 26962
PegSat
1 20546U 90028A 93336.86043166 .00007353 00000-0 19240-3 0 5267
2 20546 94.1126 187.7748 0079429 326.1008 33.5438 15.35568151202094
HST
1 20580U 90037B 93337.23514370 .00000795 00000-0 67617-4 0 3686
2 20580 28.4689 54.6088 0004547 24.2499 335.8285 14.92945302196790
MACSAT 2
1 20608U 90043B 93335.62017354 .00000208 00000-0 34439-4 0 9158
2 20608 89.9197 181.3567 0109084 62.1259 299.0977 14.64596153190354
Glonass 44
1 20619U 90045A 93336.35161052 -.00000014 00000-0 00000+0 0 9404
2 20619 65.3458 355.6623 0026483 214.2391 145.6388 2.13103000 27549
Glonass 45
1 20620U 90045B 93336.47015202 -.00000014 00000-0 00000+0 0 9336
2 20620 65.3312 355.6494 0006364 25.0435 335.0308 2.13102993 27579
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Glonass 46
1 20621U 90045C 93333.24916649 -.00000013 00000-0 10000-3 0 6177
2 20621 65.3552 355.7937 0014347 199.3974 160.6026 2.13101450 27501
Kristall
1 20635U 90048A 93335.86838634 .00013034 00000-0 17181-3 0 5422
2 20635 51.6188 97.0649 0005280 40.6029 319.4826 15.58772556445285
ROSAT
1 20638U 90049A 93335.66537897 .00000116 00000-0 17308-4 0 2203
2 20638 52.9848 158.2771 0012299 181.9519 178.1078 15.06498840192295
Meteor 2-19
1 20670U 90057A 93335.60399146 .00000015 00000-0 79036-5 0 7159
2 20670 82.5472 5.4152 0015768 346.9929 13.0856 13.84183560173284
CRRES
1 20712U 90065A 93335.30000418 .00000495 00000-0 49833-3 0 7829
2 20712 17.8334 269.6633 7196363 39.5014 355.0880 2.34855525 21227
GPS BII-08
1 20724U 90068A 93332.65070852 .00000032 00000-0 10000-3 0 7167
2 20724 54.7251 146.0232 0108701 155.4933 205.0513 2.00562457 24313
Feng Yun1-2
1 20788U 90081A 93339.47904126 .00000689 00000-0 47919-3 0 8213
2 20788 98.8533 0.7053 0014839 188.6689 174.3362 14.01384510166577
Meteor 2-20
1 20826U 90086A 93335.37726470 .00000056 00000-0 45487-4 0 7148
2 20826 82.5244 303.3602 0011729 242.0794 117.9159 13.83565277160401
GPS BII-09
1 20830U 90088A 93333.20068354 -.00000008 00000-0 10000-3 0 7167
2 20830 55.3495 88.2959 0068733 106.8767 253.8574 2.00556931 23403
GPS BIIA-10
1 20959U 90103A 93336.59832068 .00000027 00000-0 10000-3 0 6195
2 20959 54.9266 147.7373 0077027 222.0503 137.3438 2.00570664 22067
DMSP B5D2-5
1 20978U 90105A 93333.10440100 .00000184 00000-0 73668-4 0 3421
2 20978 98.7152 31.0322 0079933 33.6061 327.0188 14.32329110156457
Glonass 47
1 21006U 90110A 93335.15735931 .00000014 00000-0 00000+0 0 5470
2 21006 64.9185 116.0475 0060417 186.1135 173.7965 2.13102718 23212
Glonass 48
1 21007U 90110B 93335.34180240 .00000014 00000-0 00000+0 0 6380
2 21007 64.9320 116.0983 0037928 177.4406 182.5532 2.13101289 23213
Glonass 49
1 21008U 90110C 93335.22788108 .00000014 00000-0 00000+0 0 6396
2 21008 64.9110 116.0668 0007571 282.3600 77.5163 2.13099614 23181
INFORMTR-1
1 21087U 91006A 93334.52703634 .00000084 00000-0 82657-4 0 3725
2 21087 82.9438 289.7212 0034068 279.0086 80.7210 13.74529132142291
Cosmos 2123
1 21089U 91007A 93335.60629654 .00000062 00000-0 59526-4 0 6163
2 21089 82.9186 157.9722 0028484 300.8203 59.0141 13.74031015141507
MOP-2
1 21140U 91015B 93335.61821818 -.00000017 00000-0 00000+0 0 6155
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2 21140 0.2821 36.5931 0002625 187.9729 65.8336 1.00177814 5003
Nadezhda 3
1 21152U 91019A 93333.46951715 .00000054 00000-0 51591-4 0 7149
2 21152 82.9249 115.1414 0043165 52.1971 308.3090 13.73491254135975
Glonass 50
1 21216U 91025A 93333.29832320 -.00000014 00000-0 10000-3 0 2116
2 21216 65.0933 355.5952 0011566 215.1731 144.8105 2.13103660 20684
Glonass 51
1 21217U 91025B 93334.30131385 -.00000014 00000-0 10000-3 0 5374
2 21217 65.0880 355.5734 0012994 238.0484 121.8727 2.13101938 20703
Glonass 52
1 21218U 91025C 93333.00870685 -.00000014 00000-0 10000-3 0 1123
2 21218 65.0737 355.6291 0010636 327.7935 32.0635 2.13101994 20671
GRO
1 21225U 91027B 93332.89291156 .00004723 00000-0 86749-4 0 10
2 21225 28.4615 182.5452 0032650 186.4473 173.5288 15.46654112 26003
Meteor 3-4
1 21232U 91030A 93335.41459594 .00000043 00000-0 10000-3 0 6209
2 21232 82.5360 309.4138 0012748 329.0049 30.9981 13.16458416125336
NOAA 12
1 21263U 91032A 93335.94780045 .00000189 00000-0 93586-4 0 8205
2 21263 98.6410 2.8806 0013991 87.7504 272.5281 14.22339524132493
OKEAN 3
1 21397U 91039A 93334.33936255 .00000247 00000-0 34075-4 0 9156
2 21397 82.5257 280.7670 0022164 183.4067 176.6994 14.76061626134174
GPS BIIA-11
1 21552U 91047A 93335.37382012 -.00000009 00000-0 10000-3 0 6211
2 21552 55.6486 85.7358 0053301 232.5719 126.9732 2.00572617 17635
ERS-1
1 21574U 91050A 93332.51595343 .00000116 00000-0 50467-4 0 3357
2 21574 98.5403 44.9005 0001107 77.7084 282.4246 14.32252580123932
UO-22
1 21575U 91050B 93334.67727514 .00000086 00000-0 36002-4 0 4158
2 21575 98.4566 47.9847 0007826 156.5425 203.6132 14.36868808124578
ORBCOMM-X
1 21576U 91050C 93333.69346036 .00000103 00000-0 42047-4 0 5153
2 21576 98.4554 46.0706 0003828 160.4434 199.6930 14.36256009124374
TUBSAT
1 21577U 91050D 93334.64284627 .00000056 00000-0 26012-4 0 4157
2 21577 98.4569 47.3998 0006547 157.4320 202.7157 14.36406533124533
SARA
1 21578U 91050E 93335.65962075 .00000943 00000-0 32149-3 0 6165
2 21578 98.4649 50.7542 0004959 159.0905 201.1717 14.38605384124800
TDRS 4
1 21639U 91054B 93333.62849934 .00000119 00000-0 00000+0 0 6230
2 21639 0.0124 297.9169 0001208 328.7083 213.8094 1.00273172 6584
Meteor 3-5
1 21655U 91056A 93335.73681315 .00000043 00000-0 10000-3 0 6164
2 21655 82.5541 256.1756 0013519 337.2586 22.7976 13.16824449110479
UARS
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1 21701U 91063B 93332.63061551 .00004494 00000-0 41654-3 0 4165
2 21701 56.9840 242.6493 0005839 92.2745 267.9904 14.96170835120902
DMSP B5D2-6
1 21798U 91082A 93333.01792131 -.00000000 00000-0 10000-4 0 9943
2 21798 98.9595 333.4297 0012770 349.6469 10.4506 14.13735887103336
Glonass 53
1 21853U 92005A 93332.75227645 .00000017 00000-0 10000-3 0 8141
2 21853 64.8545 115.8571 0006802 193.9835 165.9785 2.13102463 14272
Glonass 54
1 21854U 92005B 93336.32986511 .00000013 00000-0 00000+0 0 8425
2 21854 64.8650 115.7192 0016593 19.9605 340.0750 2.13103226 14342
Glonass 55
1 21855U 92005C 93336.39020043 .00000013 00000-0 00000+0 0 8354
2 21855 64.8679 115.7239 0007493 191.5097 168.4559 2.13102247 14315
JERS-1
1 21867U 92007A 93335.58739632 .00001152 00000-0 10076-3 0 1390
2 21867 97.6645 49.0969 0001023 75.8655 284.2910 14.98659119 98783
GPS BIIA-12
1 21890U 92009A 93333.33745746 -.00000016 00000-0 10000-3 0 4166
2 21890 54.2509 264.9869 0056649 159.9572 200.2822 2.00559858 12965
GPS BIIA-13
1 21930U 92019A 93327.06663126 -.00000028 00000-0 10000-3 0 4169
2 21930 55.5092 26.0894 0047489 174.8373 185.2519 2.00562949 11771
EUVE
1 21987U 92031A 93334.36907684 .00001749 00000-0 79194-4 0 2164
2 21987 28.4344 307.3230 0010103 322.5522 37.4394 15.17839765 82145
SAMPEX
1 22012U 92038A 93335.58634195 .00001789 00000-0 15277-3 0 4213
2 22012 81.6734 18.8348 0117879 323.2681 36.0617 14.91880883 76868
GPS BIIA-14
1 22014U 92039A 93336.57472139 .00000026 00000-0 10000-3 0 3170
2 22014 54.9233 205.5779 0082572 294.5557 64.6747 2.00571644 3795
Glonass 56
1 22056U 92047A 93333.94481639 -.00000014 00000-0 00000+0 0 7366
2 22056 64.9285 355.8100 0007226 261.9492 98.0253 2.13103381 10351
Glonass 57
1 22057U 92047B 93334.70780551 -.00000014 00000-0 00000+0 0 7389
2 22057 64.9431 355.8102 0009468 300.8189 59.1402 2.13103028 10366
Glonass 58
1 22058U 92047C 93336.05668454 -.00000015 00000-0 00000+0 0 7434
2 22058 64.9397 355.7658 0012346 272.6446 87.2655 2.13103134 10410
TOPEX
1 22076U 92052A 93335.50738533 -.00000001 00000-0 10000-3 0 6726
2 22076 66.0426 341.6043 0007947 265.0097 95.0007 12.80930740 61169
KITSAT-A
1 22077U 92052B 93335.44100612 .00000000 00000-0 10000-3 0 3120
2 22077 66.0879 334.0117 0005948 336.7167 23.3555 12.86282019 61351
S80/T
1 22078U 92052C 93335.41453458 .00000000 00000-0 10000-3 0 3127
2 22078 66.0887 333.5602 0007137 344.2006 15.8781 12.86563645 61413
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TOPEX R/B
1 22079U 92052D 93335.52555749 -.00000002 00000-0 10000-3 0 3129
2 22079 66.0739 348.6637 0075861 285.7753 73.4861 12.77662220 61094
GPS BIIA-15
1 22108U 92058A 93335.54124147 -.00000014 00000-0 10000-3 0 3172
2 22108 54.4635 265.5538 0105209 133.0447 227.8684 2.00569539 8953
FREJA
1 22161U 92064A 93336.66402900 .00000122 00000-0 80359-4 0 3161
2 22161 63.0077 69.7744 0774745 297.7619 54.6832 13.21690599 55822
LAGEOS II
1 22195U 92070B 93333.41863023 -.00000004 00000-0 10000-3 0 2155
2 22195 52.6477 219.9490 0138065 30.3692 330.4783 6.47293897 26003
GPS BIIA-16
1 22231U 92079A 93335.72751351 .00000026 00000-0 10000-3 0 3199
2 22231 54.7252 206.8785 0038431 294.6947 64.9601 2.00564931 7545
GPS BIIA-17
1 22275U 92089A 93332.87646868 .00000026 00000-0 10000-3 0 3209
2 22275 54.6765 204.5421 0049724 256.5999 102.8809 2.00554265 6881
TDRS 5
1 22314U 93003B 93334.89437833 -.00000244 00000-0 10000-3 0 3173
2 22314 0.6626 72.4605 0001436 198.7919 74.2815 1.00278505 3330
GPS BIIA-18
1 22446U 93007A 93328.46576577 -.00000026 00000-0 10000-3 0 3143
2 22446 54.7625 325.6753 0069420 336.9977 22.6948 2.00552682 5832
Glonass 59
1 22512U 93010A 93335.56838262 .00000013 00000-0 00000+0 0 4389
2 22512 64.8736 115.5990 0009435 188.0587 171.9213 2.13102159 5908
Glonass 60
1 22513U 93010B 93336.44757758 .00000013 00000-0 00000+0 0 4489
2 22513 64.8691 115.5842 0007488 183.2041 176.7647 2.13102623 6128
Glonass 61
1 22514U 93010C 93334.33660305 .00000014 00000-0 00000+0 0 4332
2 22514 64.8836 115.6428 0013779 186.2756 173.6927 2.13101983 6065
ASTRO-D
1 22521U 93011A 93335.13059924 .00001080 00000-0 92825-4 0 2152
2 22521 31.1044 239.5279 0076977 317.9784 41.4972 14.92735005 42468
UHF F1
1 22563U 93015A 93335.55262900 -.00000021 00000-0 10000-3 0 2113
2 22563 26.9954 302.7133 0009371 298.4479 302.6216 0.99249493 6877
GPS BIIA-19
1 22581U 93017A 93336.08919222 -.00000024 00000-0 10000-3 0 2214
2 22581 54.9960 25.5623 0042167 33.0653 327.2571 2.00575662 5001
ProgressM17
1 22588U 93019A 93336.46500524 .00018062 00000-0 15805-3 0 3608
2 22588 51.6181 87.5208 0003568 41.9207 318.2637 15.68975057 38435
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
GPS BIIA-20
1 22657U 93032A 93332.22863843 -.00000026 00000-0 00000+0 0 2086
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2 22657 55.0745 25.5440 0058994 199.6256 160.1727 2.00572211 243
GPS BIIA-21
1 22700U 93042A 93336.68641130 -.00000013 00000-0 10000-3 0 2163
2 22700 54.6400 266.2049 0025725 307.7092 52.0883 2.00571468 3147
Soyuz TM-17
1 22704U 93043A 93335.86838634 .00013034 00000-0 17181-3 0 2460
2 22704 51.6188 97.0649 0005280 40.6029 319.4826 15.58772556445284
NOAA 13
1 22739U 93050A 93339.47171040 -.00000015 00000-0 20836-5 0 2108
2 22739 98.9259 279.8506 0009442 312.2291 47.9102 14.10865880 16644
GPS BIIA-22
1 22779U 93054A 93334.27997065 -.00000027 00000-0 10000-3 0 2240
2 22779 54.8982 325.3334 0026887 228.9668 130.7979 2.00557388 1847
Meteor 2-21
1 22782U 93055A 93330.57841316 .00000052 00000-0 42172-4 0 2132
2 22782 82.5498 6.9986 0023854 74.2891 286.0902 13.82992608 12086
SPOT 3
1 22823U 93061A 93334.66358876 .00000194 00000-0 10000-3 0 2213
2 22823 98.7379 46.9500 0000981 61.2219 298.9007 14.20028807 9315
STELLA
1 22824U 93061B 93335.68423227 .00000002 00000-0 90437-5 0 2144
2 22824 98.6777 48.2638 0007472 67.7335 292.4657 14.27093462 9503
KO-25
1 22825U 93061C 93335.66121621 .00000054 00000-0 30201-4 0 2145
2 22825 98.6748 48.2617 0009506 67.0884 293.1315 14.27592650 9503
POSAT-1
1 22826U 93061D 93335.65645330 .00000067 00000-0 35056-4 0 2151
2 22826 98.6753 48.2666 0010130 68.0262 292.2022 14.27695161 9506
HEATHSAT
1 22827U 93061E 93335.16121361 .00000081 00000-0 40985-4 0 2772
2 22827 98.6724 47.7643 0010126 57.1985 303.0169 14.27795920 9439
ITAMSAT
1 22828U 93061F 93335.65175863 .00000104 00000-0 50131-4 0 2144
2 22828 98.6701 48.2499 0010338 57.4805 302.7363 14.27796029 9500
EYESAT-1
1 22829U 93299.20720744 0.00000225 10695-3 0 2075
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
1993 061H
1 22830U 93061H 93334.73062882 .00000063 00000-0 33395-4 0 2159
2 22830 98.5750 46.7010 0012513 41.6119 318.6010 14.28019103 9370
ProgressM20
1 22867U 93064A 93325.09506298 -.00000264 00000-0 00000+0 0 249
2 22867 51.6279 151.1396 0009457 79.4698 280.9942 15.60141603443586
GPS BIIA-23
1 22877U 93068A 93335.32877300 -.00000009 00000-0 10000-3 0 170
2 22877 55.0845 86.3969 0029671 280.4191 79.2321 2.00559905 768
Cosmos 2267
1 22904U 93071A 93336.86348600 .00162713 13854-4 25918-3 0 495
2 22904 70.3824 134.3389 0035904 122.7959 237.7434 16.02243828 4415
1993 066B
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1 22906U 93066B 93335.99434814 .00068906 35256-6 57036-3 0 269
2 22906 6.8838 289.4793 7331778 211.5461 69.8507 2.27057378 525
1993 072A
1 22907U 93072A 93336.21570113 -.00000305 00000-0 00000+0 0 174
2 22907 1.4495 278.2061 0006524 232.7894 127.7868 1.00273970 135
1993 072B
1 22908U 93072B 93325.07576168 .13461502 61671-4 15488-3 0 126
2 22908 51.6548 261.8270 0005037 307.4261 52.7459 16.49846120 414
1993 072D
1 22910U 93072D 93326.69464345 -.00000037 00000-0 10000-3 0 74
2 22910 1.4974 277.8373 0014824 15.0081 151.4124 1.03165940 43
1993 073A
1 22911U 93073A 93335.21922214 -.00000034 00000-0 10000-3 0 211
2 22911 0.0244 277.6160 0007963 352.2330 130.1254 1.00285161 188
1993 073B
1 22912U 93073B 93335.22671139 -.00000070 00000-0 00000+0 0 114
2 22912 1.3375 269.2723 0001236 131.3380 95.8195 1.00346651 147
1993 073C
1 22913U 93073C 93326.11247928 .00326987 97823-5 26969-1 0 56
2 22913 6.7382 255.1865 7360381 178.5585 186.4148 2.20843869 53
1993 073D
1 22914U 93073D 93333.88810735 .00070089 61115-4 58369-2 0 21
2 22914 6.8786 250.2830 7295703 186.5057 155.2786 2.29086944 211
1993 074A
1 22915U 93074A 93332.80311691 -.00011636 81101-4 00000+0 0 17
2 22915 26.4385 243.9600 7304669 177.6472 190.6535 2.34662354 06
STS 61
1 22917U 93075A 93337.26873843 .00000095 00000-0 00000+0 0 52
2 22917 28.4704 54.4564 0043739 56.4750 98.8891 15.08705509 136
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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402. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-04 00:58:42 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.754966722@afit.af.mil>
Source record: 28512
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

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HST
1 20580U 90037B 93337.23514370 .00000795 00000-0 67617-4 0 3686
2 20580 28.4689 54.6088 0004547 24.2499 335.8285 14.92945302196790
STS 61
1 22917U 93075A 93337.26873843 .00000095 00000-0 00000+0 0 52
2 22917 28.4704 54.4564 0043739 56.4750 98.8891 15.08705509 136
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

403. Special Event Station (WA3NAN)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-04 17:51:40 UTC
From: hrsblackwell@hrs.gsfc.nasa.gov
Message-ID: <hrsblackwell-041293125140@macgwy-mac2.gsfc.nasa.gov>
Source record: 28511

Hi,
The Goddard Amateur Radio Club will operate WA3NAN from 17:00-18:00 and
20:00-21:00 UTC December 6-10 to commemorate the 10th anniversary of
Shuttle
Retransmissions. Operation will be on standard GARC Shuttle Retransmission
frequencies, which are

3860, 7185, 14295, 21395 KHz and locally on 147.45 MHz (FM).

For a certificate, send QSL or SWL and a 9x12 inch SASE to

Goddard Amateur Radio Club, WA3NAN
P.O. Box 86
Greenbelt, MD 20768-0086

Please note that these times were selected as not to interfere with STS-61
coverage.

73

Jim Blackwell, N3KWU President GARC
Goddard High Resolution Spectrograph Science Support
Computer Sciences Corporation
NASA/GSFC Code 681.0
Greenbelt, MD 20771

404. ANS-338 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 00:01:30 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-338.01.1993@ampr.org>
Source record: 28517
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-338.01
BRAMSAT NOTE ON DO-17 RETURN

HR AMSAT NEWS SERVICE BULLETIN 338.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-338.01

PY2BJO Thanks Those Who Brought DOVE Back On-Line

As reported previously in the AMSAT News Service (ANS), DOVE is back on 2M with the DOVE control team continuing their efforts to restoring it to voice operations.

Junior de Castro (PY2BJO), of BRAMSAT, the Brazilian AMSAT group, which sponsored the DOVE satellite has the following to say regarding the satellite's recent return to 2M.

"After a long time DOVE is back again on 2M at 145.825 MHz. This project was created to provide an extremely simple way for those not familiar with satellite communications, especially those new to amateur radio, to take part in this exciting phase of our hobby. DOVE is finally beginning to live up to it original promise.

After its rebirth, we at BRAMSAT are receiving many E-mail messages and letters. Up to now they total 328, from 45 countries. We are happy with this response, but we will be even happier when DOVE again becomes the popular satellite that we always knew it could be."

/EX
SB SAT @ AMSAT $ANS-338.02
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 338.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-338.02

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

12-Dec-93 0435 B 180 W9ODI WB6LLO
3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

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Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-338.03
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 338.03 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 4, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-338.03

Weekly OSCAR Status Reports: 27-NOV-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
AO-13 will experience another partial solar eclipse on 1993 Dec 13 [Mon]. It sees the Moon eclipse the Sun from 10:09 - 10:59 UTC with a maximum 53% obscuration at 10:34 UTC. This is Orbit #4211 MA 73-92. The encounter will be "visible" on the telemetry to stations throughout the USA and Japan. Reports would be appreciated. Stations who observed this spectacular eclipse of Dec 13 will know what to look for. Eclipses of the sun by earth commence on Dec 07 [Tue] and continue until Dec 24 [Fri]. The eclipses are, of course, total. The maximum lasts 2 hours and 16 minutes, and is the longest AO-13 has ever experienced. The telemetry during these outages is very interesting, particularly the spacecraft temperatures; some reach -40 C. The Mode-B transponder will be OFF from MA 95 to 180 during this two week period. [G3RUH/DB2OS/VK5AGR]

FO-20: The following is the FO-20 operating schedule:
Analog mode: 01-Dec-93 08:43 -to- 07-Dec-93 7:16 UTC
15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC
Digital mode: otherwise noted above. In December, analog mode and

digital mode will be ON alternately for a week, respectively.
[JJ1WTK]

RS-12: KA3TGY reports that he had a great deal of fun on RS-12 this past week when he mat a contact with CY0SAB. KA3TGY used a R-7 vertical with 100 watts output to make the contact on RS-12 on 15M. This was KA3TGY's first contact and he notes that he never realized what he was missing by not working RS-12! [KA3TGY]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

405. San Francisco - Shuttle Audio

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 07:37:56 UTC
From: tmills@netcom.com
Message-ID: <tmillsCHLrv8.MqD@netcom.com>
Source record: 28514

Shuttle audio can be heard on 145.585 in the SF area (with heavy noise)

Anyone have any idea of what happened to ames?

406. APT-Satellites: Report DEC 05, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 08:55:28 UTC
From: peter.henne@gmd.de
Message-ID: <1993Dec6.085528.15974@gmd.de>
Source record: 28515
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, DEC 05, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 On
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 ??? *
Meteor 3-3: APT 137.30 On
Meteor 3-5: APT 137.30 ON again **

* Meteor 2-21 now orbits around the terminator and I could
not receive any APT-Signal from the dim illuminated northern
hemisphere.
** Meteor 3-5 is active again after a long time of silence.
Good vis-images from noon-ascending passes, some few streaks,
very good signal-strength. As Meteor 3-3 too is drifting more
towards morning darkness, Meteor 3-5 will be the only source
for good vis-imagery from the northern hemisphere during the
next dark month.
IR-imaging-format from dark parts of the orbit is somewhat
uncommon: 20 lines per minute as was used first by Meteor 2-16,
Meteor 3-1 and Meteor 3-2.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

407. Re: NASA STS-61 Shuttle Retransmissions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 10:22:00 UTC
From: stocker@nssdca.gsfc.nasa.gov
Message-ID: <6DEC199306225918@nssdca.gsfc.nasa.gov>
Source record: 28516

In article <CHGp1u.M9t@mentor.cc.purdue.edu>, bap@mace.cc.purdue.edu (Bret Pennington) writes...
>Last evening from West central Indiana I tried all evening
>to get the GARC SSB frequencies 3860, 7185, 14295, 21395, and 28650.
>3860 had a lot of stuff on it but I couldn't get it clearly. I heard
>someone say "Endeavor" faintly but that was all. When I do get something
>what should I expect? Continuous transmission? Also where is the GARC
>transmitter and what is its power and asimuth? Is Indiana
>too far away to get it?
>I am using a DX-390 with 140 longwire.
>Did anyone else hear anything.
>I did get the launch on 5180 SSB at 427 AM EST :-)
>
>Sincerely,
>
>BRET A. PENNINGTON
>COMPUTER TECHNICIAN
>DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES
>CIVL 4252 4-0678 (317-494-0678)
>PURDUE UNIVERSITY
>WEST LAFAYETTE, INDIANA 47907
>bap@mace.cc.purdue.edu

No you won't get continuous transmission on any of the retransmission. This is a true retransmission. When there is space to ground communications going on then you will hear something. For example, if the crew is scheduled to sleep then nothing is sent obviously.

The output signals should be fairly strong from GARC but propagation and your rig/antenna will still be the determiner of how well you can receive.

Erich
N3OXM

408. 80+miles range radio (phone) equipment needed- any advice

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 19:01:54 UTC
From: yuri@atmos.washington.edu
Message-ID: <2dvvj2$6nj@news.u.washington.edu>
Source record: 28520
Cross-posted to:
rec.radio.noncomm,rec.radio.shortwave,rec.radio.amateur.equipment,rec.radio.amateur.digital.misc,rec.radio.amateur.space

Hi,
and sorry for (may be) wrong group. My frined doesn't have access to Internet,
but he wants to have radiophone with 80+ (100+) miles range.
He said, that it should be somathing like (or better than) "Tomahawk-8000".
We will appreciateany places to call/price ranges-ANY ADVICE.

Please reply directly- I don't read these groups lately.

INTERNET: yuri@atmos.washington.edu
UUCP: uw-beaver!atmos.washington.edu!yuri

409. ARLK051 Keplerian data

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 19:31:39 UTC
From: lhurder@arrl.org
Message-ID: <$arlk051.1993@ampr.org>
Source record: 28537
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.misc,rec.radio.info

```
SB KEP @ ARL $ARLK051
ARLK051 Keplerian data

ZCZC SK63
QST de W1AW
Keplerian Bulletin 51 ARLK051
From ARRL Headquarters
Newington, CT December 4, 1993
To all radio amateurs

SB KEP ARL ARLK051
ARLK051 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

STS-61
1 22917U 93075 A 93338.39481481 0.00000532 50000-4 0 112
2 22917 28.4700 47.1258 0004745 35.5549 89.3999 14.92968181 312
HST
1 20580U 90037 B 93338.39481481 0.00000532 50000-4 0 3697
2 20580 28.4700 47.1258 0004745 35.5549 89.3999 14.92968181196963
AO-10
1 14129U 83058 B 93328.37358304 0.00000006 10000-3 0 2126
2 14129 27.1967 354.6814 6020029 132.8205 296.5509 2.05877703 50585
RS-10/11
1 18129U 87054 A 93332.42270253 0.00000059 57861-4 0 8140
2 18129 82.9259 117.2417 0010740 217.0444 143.0089 13.72327034322379
UO-11
1 14781U 84021 B 93334.56060295 0.00000200 37883-4 0 6150
2 14781 97.7956 353.4973 0011482 179.8391 180.2820 14.69091713521149
RS-12/13
1 21089U 91007 A 93335.60629654 0.00000062 59526-4 0 6162
2 21089 82.9186 157.9722 0028484 300.8203 59.0141 13.74031015141507
AO-13
1 19216U 88051 B 93335.84660375 -.00000229 10000-4 0 8204
2 19216 57.9029 281.1629 7211005 329.5804 3.4589 2.09726084 10377
UO-14
1 20437U 90005 B 93334.69642848 0.00000066 33274-4 0 9151
2 20437 98.6046 57.0601 0011889 55.3459 304.8840 14.29806558201220
```

```
AO-16
1 20439U 90005 D 93334.68970974 0.00000056 29505-4 0 7155
2 20439 98.6123 58.0868 0012249 55.8918 304.3434 14.29863405201239
DO-17
1 20440U 90005 E 93334.66327841 0.00000062 31771-4 0 7159
2 20440 98.6134 58.3203 0012311 55.5998 304.6342 14.30000807201247
WO-18
1 20441U 90005 F 93334.21540152 0.00000060 31195-4 0 7162
2 20441 98.6128 57.8916 0012863 57.2334 303.0100 14.29978366201181
LO-19
1 20442U 90005 G 93334.69648230 0.00000055 29004-4 0 7150
2 20442 98.6137 58.5780 0013153 55.4957 304.7459 14.30070867201268
FO-20
1 20480U 90013 C 93330.50118171 -.00000019 -16586-4 0 6111
2 20480 99.0189 155.8314 0541157 78.7761 287.3633 12.83222138178132
AO-21
1 21087U 91006 A 93334.52703634 0.00000084 82657-4 0 3724
2 21087 82.9438 289.7212 0034068 279.0086 80.7210 13.74529132142291
UO-22
1 21575U 91050 B 93334.67727514 0.00000086 36002-4 0 4157
2 21575 98.4566 47.9847 0007826 156.5425 203.6132 14.36868808124578
KO-23
1 22077U 92052 B 93335.44100612 0.00000000 10000-3 0 3129
2 22077 66.0879 334.0117 0005948 336.7167 23.3555 12.86282019 61351
Arsene
1 22654U 93031 B 93321.93138545 -.00000051 10000-3 0 2107
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
KO-25
1 22827U 93061 E 93335.16121361 0.00000081 40985-4 0 2771
2 22827 98.6724 47.7643 0010126 57.1985 303.0169 14.27795920 9439
IO-26
1 22826U 93061 D 93335.65645330 0.00000067 35056-4 0 2150
2 22826 98.6753 48.2666 0010130 68.0262 292.2022 14.27695161 9506
AO-27
1 22825U 93061 C 93335.66121621 0.00000054 30201-4 0 2144
2 22825 98.6748 48.2617 0009506 67.0884 293.1315 14.27592650 9503
PO-28
1 22829U 93061 G 93299.20720744 0.00000225 10695-3 0 2074
2 22829 98.6741 12.0806 0010509 157.5898 202.5757 14.27978468 4306
Mir
1 16609U 86017 A 93336.31717093 0.00019897 25845-3 0 103
2 16609 51.6174 94.8137 0005668 49.1420 311.0252 15.58790642445335

Keplerian bulletins are transmitted twice weekly from W1AW.
The next scheduled transmission of these data will be Tuesday,
December 7, 1993, at 2330z on Baudot and AMTOR.
NNNN
/EX
```

410. Special Event Station (WA3NAN) correction

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 19:48:23 UTC
From: hrsblackwell@hrs.gsfc.nasa.gov
Message-ID: <hrsblackwell-061293144823@macgwy-mac2.gsfc.nasa.gov>
Source record: 28521

Hi,
The Goddard Amateur Radio Club will operate WA3NAN from 17:00-18:00 and
22:00-23:00 UTC (5-6 PM EST) December 6-10 to commemorate the 10th
anniversary
of Shuttle Retransmissions. Operation will be on standard GARC Shuttle
Retransmission frequencies, which are

3860, 7185, 14295, 21395 KHz and locally on 147.45 MHz (FM).

For a certificate, send QSL or SWL and a 9x12 inch SASE to

Goddard Amateur Radio Club, WA3NAN
P.O. Box 86
Greenbelt, MD 20768-0086

Please note that these times were selected as not to interfere with STS-61
coverage. Also note the time change from a previous announcement!

73

Jim Blackwell, N3KWU
Goddard High Resolution Spectrograph Science Support
Computer Sciences Corporation
NASA/GSFC Code 681.0
Greenbelt, MD 20771

411. Oscar frequencies???

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 22:31:39 UTC
From: murphyed1@woods.uml.edu
Message-ID: <1993Dec6.173139.1@woods.uml.edu>
Source record: 28518

Can anyone send me an update of the up/downlink frequencys of the ham satelites
that are up there??? I am trying to convince my father (N1CDC) to invest :-)
in the 736 uhf/vhf all mode tranciever. and the downlinks of the stuff (more
than just rs-10/11) would be a great help untill we join AMSAT...

Thanks in advance...

Ed...

===== Ed Murphy (The University disclaims everything!) --- | / ----
| Internet Mail :: Murphyed1@woods.ulowell.edu /|\ |/ \
===== "Warning, Phi Kap's May Be Habit Forming!!!" \|/ |\ /
| Groundmail (The Slow Way) 1 University Ave. Box 1136 --- | \ ----
=== Lowell, Ma. 01854 U.S.A. Phi Kappa Sigma
Gamma Upsilon Chapter
Ham Radio -- N1OQF

412. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 23:12:51 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755219571@afit.af.mil>
Source record: 28523

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93339.57493170 .00028070 00000-0 26172-2 0 3718
2 20580 28.4705 39.5197 0004900 49.8661 310.3057 14.92996262 474
STS 61
1 22917U 93075A 93340.21665509 .00000271 00000-0 18280-4 0 161
2 22917 28.4699 35.3802 0005051 69.3021 146.6976 14.92803280 572
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

413. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-06 23:13:07 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755219587@afit.af.mil>
Source record: 28519
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93339.57493170 .00028070 00000-0 26172-2 0 3718
2 20580 28.4705 39.5197 0004900 49.8661 310.3057 14.92996262 474
STS 61
1 22917U 93075A 93340.21665509 .00000271 00000-0 18280-4 0 161
2 22917 28.4699 35.3802 0005051 69.3021 146.6976 14.92803280 572
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

414. Re: Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-07 12:56:30 UTC
From: burke_br@adcae1.comm.mot.com
Message-ID: <1993Dec7.125630.25147@lmpsbbs.comm.mot.com>
Source record: 28529
Cross-posted to: rec.radio.amateur.space,sci.space

}HST
}1 20580U 90037B 93339.57493170 .00028070 00000-0 26172-2 0 3718
}2 20580 28.4705 39.5197 0004900 49.8661 310.3057 14.92996262 474
}STS 61
}1 22917U 93075A 93340.21665509 .00000271 00000-0 18280-4 0 161
}2 22917 28.4699 35.3802 0005051 69.3021 146.6976 14.92803280 572
}--
}Dr TS Kelso Assistant Professor of Space Operations
}tkelso@afit.af.mil Air Force Institute of Technology

NASA Spacelink BBS also provides Keps. Their number is (208)895-0028
or on internet 192.149.89.61 The internet address accesses both an ftp site
and the BBS on telnet. The ftp login is anonymous and password is guest.

Mr. Kelso, please post the element set number next time. Also, the Hubble
keps won't be valid any longer since they made the manuever to back away
from the bad solar array.

73,
Bruce, WB4YUC, el YUCCO. . .

415. STS-61 Keps GSFC-013

Newsgroup: rec.radio.amateur.space
Date: 1993-12-07 13:01:07 UTC
From: burke_br@adcae1.comm.mot.com
Message-ID: <1993Dec7.130107.25243@lmpsbbs.comm.mot.com>
Source record: 28522

```
STS-61 KEPLERIAN ORBITAL ELEMENTS

STS-61
1 22917U 93075A 93339.50807012 0.00000289 00000-0 19876-4 0 136
2 22917 28.4705 39.9519 0005036 48.7431 311.3588 14.92978392 481

Satellite: STS-61
Catalog number: 22917
Epoch time: 93339.50807012 (05 DEC 93 12:11:37.26 UTC)
Element set: GSFC-013
Inclination: 28.4705 deg
RA of node: 39.9519 deg Space Shuttle Flight STS-61
Eccentricity: 0.0005036 Keplerian Elements
Arg of perigee: 48.7431 deg
Mean anomaly: 311.3588 deg
Mean motion: 14.92978392 rev/day Semi-major Axis: 6966.7867 Km
Decay rate: 0.29E-05 rev/day*2 Apogee Alt: 591.91 Km
Epoch rev: 48 Perigee Alt: 584.89 Km

NOTE - This element set is based on NORAD element set # 013.
```

416. Satellite tracking s/w for Unix?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-07 21:53:46 UTC
From: russell@spdcc.com
Message-ID: <CHoq5M.AJo@spdcc.com>
Source record: 28524

I've been looking around for software that will tell me when passes will occur, much like the "analytical solution" mode of TrakSat for DOS machines (azimuth, elevation, direction of travel, distance, etc) but haven't had any luck. I don't require (or want) graphics support, just a text list of upcoming passes. Is there such a beast, and if so, where can I get it? I'd very much appreciate any pointers.

Thanks and 73,

--
Tim Russell russell@spdcc.com
Most people would rather have comfort than freedom. The paradox is that you can't really have the former, in the long term, unless you have the latter.
-- Amanda Walker

417. Kitsat-OSCAR-25

Newsgroup: rec.radio.amateur.space
Date: 1993-12-07 21:58:10 UTC
From: Chris Beasley <cb1p+@andrew.cmu.edu>
Message-ID: <gh1DlmW00YUoFUupEk@andrew.cmu.edu>
Source record: 28525

Hi folks,
I have been lurking here for a while and am now ready to ask my first question!

I have just joined AMSAT but have yet to Rx any info from them.

I am wondering about this new? oscar-25 that I have read about that has cameras on it. Will I be able to "listen" to a beacon from it and decode a picture of the earth? Or will I have to "download" somehow?

I realize that I can get "wefax" capable equipment from a variety of vendors. Is this the same format? What kind of equipment will I need?

Antennae?

AZ/EL rotator? If yes, I think I should get one with computer control capability as I have a 486 machine I wish to manipulate the images on.

Amplifiers????

Decoder/Demodulator? I know I am going to need something like this but I don't know what kind and what the most popular formats are. I assume this device will have a computer interface on it. Will some of these do packet also? Is this related to AMTOR/PACKTOR?

I have a lot of questions I know and I am perusing the literature at a feverish rate, I just wanted to use the shotgun approach so that I could saturate myself with information.

Any and all replies are appreciated. If there are a lot I will certainly summarize to the net.

Thanks,
73
N3PDG (pudgy?) (pretty darn good?)

Chris Beasley

418. SatTrack --- Unix satellite tracking program

Newsgroup: rec.radio.amateur.space
Date: 1993-12-08 00:24:08 UTC
From: manfred@isi5.ssl.berkeley.edu
Message-ID: <2e36r9$b2r@agate.berkeley.edu>
Source record: 28526

SatTrack V1.7 re-Release

A while back I released the version 1.7 of the satellite tracking
program I've written for Unix machines. I hope most of the bugs have been
found (at least the remaining ones ought to be of minor impact). You can get
SatTrack from ucsd.edu (128.54.16.1). Do the following:

```
ftp ucsd.edu
login anonymous
password: YOUR_EMAIL_ADDRESS
cd hamradio/packet/tcpip/incoming
get sattrack.V1.7.tar.Z
```

Place this file into your Unix home directory, uncompress it, and then
type 'tar xvpf sattrack.V1.7.tar'. This will unbundle the distribution file
and create all subdirectories that are necessary. Then look into the
documentation file 'sattrack.doc' in SatTrack/Doc for instructions how to
compile sattrack (and some other auxiliary programs). Please let me know how
it works and if there are any bugs that I haven't encountered yet. It should
compile perfectly on at least Sun-3's (SunOS 4.0.3) and SPARCstation IPCs
(SunOS 4.1.1). Some machines require stdlib.h to be included. In this case
comment out the line

```
#define SUNOS4
```

in sattrack.h before compilation. There is a fix to be made to the shell
script 'getElementSets' for the anonymous FTP access of two-line orbital
elements, however: a 'dash' needs to be put in front of your login name,
as shown below. Also, I believe the Internet address has changed. The new
one below is known to work fine.

```
cd $HOME/SatTrack/Data
ftp -n 129.92.1.66 << !
user anonymous -manfred@isi5.ssl.berkeley.edu
cd /pub/space
get tle.new
quit
!
cp tle.dat tle.bak
mv tle.new tle.dat
```

In the meantime I have been working on various updates. My current version
is V1.11, but this has not been tested fully yet. The next version to be
released (V2.0) will have implemented (amongst a few extra features) the
NORAD SGP4/SDP4 code for precision tracking. I hope this will be ready and
tested early next year.

73, Manfred --- W6/DL5KR

Manfred Bester
Space Sciences Lab
University of California
Berkeley, CA 94720
(510) 642-8497
e-mail: manfred@ssl.berkeley.edu

419. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-08 01:32:26 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755314346@afit.af.mil>
Source record: 28527

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93340.57763371 -.00010895 00000-0 -10401-2 0 3720
2 20580 28.4710 33.0526 0005228 74.4558 285.3400 14.92850041 622
STS 61
1 22917U 93075A 93340.60462947 .00010758 00000-0 10000-2 0 199
2 22917 28.4724 32.8782 0005129 72.1803 72.9843 14.92862373 635
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

420. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-08 01:32:41 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755314361@afit.af.mil>
Source record: 28528
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93340.57763371 -.00010895 00000-0 -10401-2 0 3720
2 20580 28.4710 33.0526 0005228 74.4558 285.3400 14.92850041 622
STS 61
1 22917U 93075A 93340.60462947 .00010758 00000-0 10000-2 0 199
2 22917 28.4724 32.8782 0005129 72.1803 72.9843 14.92862373 635
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

421. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 02:29:21 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755404161@afit.af.mil>
Source record: 28530

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93342.18224267 .00001976 00000-0 17144-3 0 3736
2 20580 28.4711 22.7168 0004834 74.5428 286.4012 14.92967518 864
STS 61
1 22917U 93075A 93341.60416667 .00000286 00000-0 19688-4 0 219
2 22917 28.4699 26.4384 0005644 80.6580 46.6994 14.92813976 787
HST Array
1 22920U 90037C 93341.24574881 .00016001 00000-0 14665-2 0 75
2 22920 28.4688 28.7427 0005369 44.8841 315.2030 14.93573373 723
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

422. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 02:29:37 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755404177@afit.af.mil>
Source record: 28531
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93342.18224267 .00001976 00000-0 17144-3 0 3736
2 20580 28.4711 22.7168 0004834 74.5428 286.4012 14.92967518 864
STS 61
1 22917U 93075A 93341.60416667 .00000286 00000-0 19688-4 0 219
2 22917 28.4699 26.4384 0005644 80.6580 46.6994 14.92813976 787
HST Array
1 22920U 90037C 93341.24574881 .00016001 00000-0 14665-2 0 75
2 22920 28.4688 28.7427 0005369 44.8841 315.2030 14.93573373 723
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

423. Two-Line Element Set Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 07:36:37 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755422597@afit.af.mil>
Source record: 28532
Cross-posted to: sci.space,rec.radio.amateur.space

Why is it that separate element sets are generated for both STS 61 and the Hubble Space Telescope (HST) when they are docked together? Why aren't these element sets identical?

Since these questions have come up several times during the STS 61 mission to service the Hubble Space Telescope and arise from time to time with regard to the Mir space station, I thought I'd take this opportunity to answer them in some detail here.

NORAD has responsibility for tracking all man-made objects in earth orbit. In performing this function, NORAD maintains a catalog of each individual it tracks, even if that object is subsequently docked to another object. Such is the case for STS 61 and the HST or the various modules of the Mir space station (Mir, Kvants 1 and 2, Kristall, and various Soyuz and Progress). And they also maintain separate element sets for each object.

Of course, these objects are physically locked together and the observations collected for one object could be used for updating the elements for all objects. But that's not necessarily how it works. Since NORAD has to track over 7,000 objects every day, the process is automated. Here's how it works.

Observations are collected for an object and used to generate a two-line element set using a process known as differential corrections. The two-line element set is used to predict the observations (using the SGP4 orbital model) and the differences between actual and predicted observations are compared. A correction to the two-line element set is determined which moves to minimize these differences (something like doing a multi-dimensional Newton search). This process is repeated until convergence is reached.

The element set generated by this process will be used until subsequent observations show its predictions to be off by more than some preset amount. For the data I make available, that is five kilometers (90 percent confidence interval). Five kilometers may seem like a large distance until you realize that most of the error will be in the in-track direction and that it amounts to less than one second's travel in near-earth orbits. Once the current element set is determined to be out of tolerance, a new element set is generated.

Now, since all observations have error, the element sets generated will remain in tolerance for differing periods of time. How long will depend on the site used to collect the observations, the viewing geometry, changes in atmospheric density or spacecraft attitude, maneuvers, and so on. As such, updates to separate components of a docked structure will be updated at different times.

Okay, so even if NORAD tracks each object separately and maintains separate element sets, why are the element sets different? To understand the answer to this question requires a basic understanding of satellite orbits. Only ideal orbits describe true ellipses and have constant orbital elements. Real orbits experience both periodic and secular (trending) effects in their elements. Because of this, there are various ways of describing orbital elements.

One way is to use osculating (touching) or instantaneous orbital elements, that is, the instantaneous values of each element at the specified epoch (time). The other is to use mean orbital elements. The NORAD two-line element sets use mean orbital elements. In *neither* case will the elements generated be constant over time. In the SGP4 orbital model, the mean is extracted in a particular way to not only allow combination with the various perturbing forces (geopotential, atmospheric drag, solar/lunar gravitational effects, and solar radiation pressure) to generate accurate predictions but to also permit quick calculations (it is an analytical model which means you can plug in a time and get out a position and velocity *without* numerical integration).

To develop a better understanding of this concept, try to describe the mean x and y position of an object traveling along a circle. Taken over a long enough period of time, it is the origin of the circle -- not terribly useful. To be more specific, you must specify a time associated with your mean -- change the time and you change the mean. Therefore, if two or more objects are docked together in earth orbit, their orbital elements will not match unless the epoch of the element sets are identical. And even that assumes the elements were generated from identical observations with identical update processes. However, predictions of each object's position and velocity, using the NORAD SGP4 orbital model, should be the same within the error tolerance.

Remember, I did not develop this process but am only explaining it. While I can think of ways to improve it, you must also remember that it has evolved slowly over time and is resistant to radical changes (as is any bureaucracy). You may be thinking that it would make more sense to generate only one element set for a group of docked objects, realizing that the error in prediction can be on the order of five kilometers! You might think that a single element set would result in no error. However, the error is still there -- a single element set just seems more consistent. Actually, multiple element sets provide the advantage of redundancy -- protecting you from the occasional bad element set.

Before I quit, I'd like to take this opportunity to explain why it is important to use an orbital prediction program based upon the NORAD SGP4 orbital model when using the two-line element sets. As with fitting any kind of data, the coefficients determined depend upon the model used. Imagine a set of points (with noise) that you want to fit a curve to and determine the constant term. If you use a linear fit, you get one value; a quadratic fit yields another; and a cubic fit yet another. If you take the value for the cubic fit and apply a linear projection, you won't get very good results.

The same is true for the NORAD two-line element sets. If you take the mean values from these element sets (the constant terms) and put them into a different orbital model (say, a simple two-body model), you won't get very

good predictions. Likewise, if you take some other data (for example, the AMSAT data) and "convert" it to the two-line format, that does NOT make it two-line data compatible with the SGP4 model. I *strongly* discourage people from converting other data into the two-line format, particularly if you are reposting it, because the two-line format implies that the data was generated with the NORAD SGP4 orbital model and will produce compatible results. You will cause other users a great disservice by distributing converted two-line element sets since they will *not* produce accurate predictions.

I have made, and will continue to make, every effort to make NORAD two-line element sets and the associated orbital models available to the satellite community. I welcome you to take advantage of these materials to produce the most accurate predictions readily available. I hope this answer your questions. - TS

--

Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

424. Shuttle radio transmissions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 09:43:23 UTC
From: boyer@rd.eng.bbc.co.uk
Message-ID: <CHrHoC.MJB@bbc.co.uk>
Source record: 28538

I would like to listen to the shuttle. I realise that this will only be possible if it transmits on HF. has anyone got any frequncies?

Thanks for your attention.

John.Boyer@rd.eng.bbc.co.uk.

425. Re: Mode-A Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 10:59:54 UTC
From: kerskine@ftp.com
Message-ID: <kerskine.9.0@ftp.com>
Source record: 28534

Victor,

Here are some answers based on my experiences (and may be helpful to others)

>1. Is a 10M preamp usually necessary?

While a pre-amp might be handy for low horizon passes, I never had a problem listening to my downlink on either a dipole, or my 10m Ringo Ranger.

>2. Is CW used at all on this mode ... or does SSB predominate?

On RS-10, I'd say its 60% SSB, 40% CW. Sometimes people will initiate a contact with SSB and finish with CW when it's close to LOS

>3. How much power do I need on the uplink and what type of antenna?

Remembering that you only use enough power as necessary (which is especially true with Satellite transponders), I've made successful contacts on SSB with 10 watts into a 1/4 ground plane!

>4. Is it practical at all to key the mike, of an FM rig, to produce CW
> for the uplink?

Don't know on this question, but I've heard that it can be done.

Regards...Keith - KA1RHO

426. Some satellite tracking questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 13:06:04 UTC
From: wa2sff@cbnewsh.cb.att.com
Message-ID: <CHrr26.H6A@cbnewsh.cb.att.com>
Source record: 28539

What are people's opinions on the following:

1) What is a good satellite tracking program?

I have been evaluating traksat and I am close to sending in
my registration fee.
I have also seen ads for Instanttrack from AMSAT and Realtrak
from R Meyers. Are either of these two better and why?
Should I have more than one, if so why?

2) Are the R Meyers Communications newsletters worth
the $64 per year for the two OSCAR reports.
I do plan to join AMSAT. Is the AMSAT newsletter sufficient?

3) Are there any HW/SW plans for radio control and
antenna control besides the Kansas City Tracker?
Was the KCT described in an article somewhere?

Joe Wilkes
j.e.wilkes@att.com

427. Mode-A Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 14:30:28 UTC
From: tavernin@sun1.interlan.com
Message-ID: <CHruyt.Ktx@rd1.InterLan.COM>
Source record: 28541

I have a couple of questions about Mode-A on RS-10/11 and RS-12/13 ...

1. Is a 10M preamp usually necessary?

2. Is CW used at all on this mode ... or does SSB predominate?

3. How much power do I need on the uplink and what type of antenna?

4. Is it practical at all to key the mike, of an FM rig, to produce CW
for the uplink?

Thanks,

Victor Tavernini
Racal-Datacom, Inc.

tavernin@sun1.interlan.com

428. Free Radio Bands Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 16:08:20 UTC
From: mb7s@fermi.clas.Virginia.EDU
Message-ID: <CHrzHw.Bp9@murdoch.acc.Virginia.EDU>
Source record: 28543

Someone has asked me recently what if he wants to build a competing network for cellular phones. Are there any gaps yet in the bandwidth? Whom should he ask to? Federal Communication Commission? Any information would be appreciated.

Mike.

429. Re: Mode-A Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 18:37:42 UTC
From: k9jma@cbnewsc.cb.att.com
Message-ID: <CHs6Ex.Hn5@cbnewsc.cb.att.com>
Source record: 28533

In article <CHruyt.Ktx@rd1.InterLan.COM> tavernin@sun1.interlan.com (Victor Tavernini) writes:
>
>I have a couple of questions about Mode-A on RS-10/11 and RS-12/13 ...

Mode A only on RS-10 now and RS-12 listens only on 15 Meters.
>
>1. Is a 10M preamp usually necessary?

I haven't needed one with HTX-100, ICR-7000, or IC725 and a ground mounted vertical quarter wave antenna.
>
>2. Is CW used at all on this mode ... or does SSB predominate?

I use about 95% CW, although I hear lots of SSB further up the passband. Seems to be plenty of activity of either flavor.
>
>3. How much power do I need on the uplink and what type of antenna?

I run 90 watts input (50 output) to a SSB converted Viking 6N2 on 2 meters and the antenna is a J mounted on the chimney. On RS12 I use the IC725 TX and a 40 meter flat top antenna. Most times 25 - 50 watts out is enough.
>
>4. Is it practical at all to key the mike, of an FM rig, to produce CW
> for the uplink?

Tried it on a Heath HW-2036 - lots of chirp, and lack of continuous tuning is a problem. Power was marginal for the J TX antenna.
>
>Thanks,
>
>Victor Tavernini
>Racal-Datacom, Inc.
>
>tavernin@sun1.interlan.com

Good Luck, 73, and hope to see you on the birds.
--
Ed Schaefer K9JMA ham radio N97178 aviation

430. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 22:01:08 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755474468@afit.af.mil>
Source record: 28535

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93343.18508079 .00000076 00000-0 00000+0 0 3765
2 20580 28.4780 16.2689 0007069 285.6419 73.7052 14.90298696 126
STS 61
1 22917U 93075A 93342.12500000 .00000295 00000-0 21985-4 0 237
2 22917 28.4696 15.6475 0006200 264.6597 131.7637 14.90324219 1018
HST Array
1 22920U 90037C 93342.31490804 .00010362 00000-0 94498-3 0 84
2 22920 28.4706 21.8428 0005204 56.4306 303.6295 14.93589116 885
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

431. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-09 22:01:25 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755474485@afit.af.mil>
Source record: 28536
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93343.18508079 .00000076 00000-0 00000+0 0 3765
2 20580 28.4780 16.2689 0007069 285.6419 73.7052 14.90298696 126
STS 61
1 22917U 93075A 93342.12500000 .00000295 00000-0 21985-4 0 237
2 22917 28.4696 15.6475 0006200 264.6597 131.7637 14.90324219 1018
HST Array
1 22920U 90037C 93342.31490804 .00010362 00000-0 94498-3 0 84
2 22920 28.4706 21.8428 0005204 56.4306 303.6295 14.93589116 885
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

432. Re: Dealing with Doppler Shift?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 11:42:39 UTC
From: kerskine@ftp.com
Message-ID: <kerskine.10.0@ftp.com>
Source record: 28550

In article <2e9vkd$8jr@oak.oakland.edu> prvalko@vela.acs.oakland.edu (prvalko) writes:

>The way I understand it, one uses the satellites such that the LOWER
>frequency never gets adjusted. i.e. on RS-10/11 you tune the 145
>transmitter so that the 29 MHz receive frequency stays put.

That's right. If you start moving your downlink frequency on your receiver,
not only do you create a lot of frustration, but you can interfere with other
QSOs

73...Keith - KA1RHO

433. CONFIG

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 13:03:00 UTC
From: tuomas.karttunen@compart.fi
Message-ID: <1f.14.1818.0NC5A992@compart.fi>
Source record: 28540

```
DROP 1818
```

434. Dealing with Doppler Shift?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 14:03:57 UTC
From: prvalko@vela.acs.oakland.edu
Message-ID: <2e9vkd$8jr@oak.oakland.edu>
Source record: 28542

The way I understand it, one uses the satellites such that the LOWER frequency never gets adjusted. i.e. on RS-10/11 you tune the 145 transmitter so that the 29 MHz receive frequency stays put.

Am I right or wrong on this?

73 paul wb8zjl (newbie)

435. ORBS$344.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 16:50:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-344.o.1993@ampr.org>
Source record: 28544
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-344.O
Orbital Elements 344.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX December 10, 1993
BID: $ORBS-344.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93329.34450477
Element set: 213
Inclination: 27.1217 deg
RA of node: 354.5434 deg
Eccentricity: 0.6014493
Arg of perigee: 132.9243 deg
Mean anomaly: 298.0909 deg
Mean motion: 2.06477387 rev/day
Decay rate: 9.0e-08 rev/day^2
Epoch rev: 7858
Checksum: 313

Satellite: UO-11
Catalog number: 14781
Epoch time: 93342.66573932
Element set: 617
Inclination: 97.7956 deg
RA of node: 1.2301 deg
Eccentricity: 0.0012043
Arg of perigee: 153.7437 deg
Mean anomaly: 206.4353 deg
Mean motion: 14.69097732 rev/day
Decay rate: 3.37e-06 rev/day^2
Epoch rev: 52233
Checksum: 298

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93337.45348696
Element set: 815
Inclination: 82.9255 deg
RA of node: 113.5236 deg
Eccentricity: 0.0011195
Arg of perigee: 202.4287 deg
```

Mean anomaly: 157.6376 deg
Mean motion: 13.72327170 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 32306
Checksum: 298

Satellite: AO-13
Catalog number: 19216
Epoch time: 93336.80025401
Element set: 821
Inclination: 57.8913 deg
RA of node: 280.9905 deg
Eccentricity: 0.7209935
Arg of perigee: 329.6810 deg
Mean anomaly: 3.4424 deg
Mean motion: 2.09721276 rev/day
Decay rate: -1.19e-06 rev/day^2
Epoch rev: 4189
Checksum: 305

Satellite: FO-20
Catalog number: 20480
Epoch time: 93338.53163149
Element set: 612
Inclination: 99.0174 deg
RA of node: 162.3283 deg
Eccentricity: 0.0541196
Arg of perigee: 60.5893 deg
Mean anomaly: 304.8188 deg
Mean motion: 12.83222700 rev/day
Decay rate: 2.5e-07 rev/day^2
Epoch rev: 17916
Checksum: 296

Satellite: AO-21
Catalog number: 21087
Epoch time: 93338.53066287
Element set: 373
Inclination: 82.9439 deg
RA of node: 286.7581 deg
Eccentricity: 0.0033930
Arg of perigee: 267.3519 deg
Mean anomaly: 92.3725 deg
Mean motion: 13.74529222 rev/day
Decay rate: 8.4e-07 rev/day^2
Epoch rev: 14284
Checksum: 327

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93340.55801944

Element set: 617
Inclination: 82.9190 deg
RA of node: 154.3003 deg
Eccentricity: 0.0028317
Arg of perigee: 286.8165 deg
Mean anomaly: 72.9884 deg
Mean motion: 13.74031130 rev/day
Decay rate: 3.5e-07 rev/day^2
Epoch rev: 14219
Checksum: 295

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

436. ORBS$344.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 16:53:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-344.d.1993@ampr.org>
Source record: 28545
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-344.D
Orbital Elements 344.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX December 10, 1993
BID: $ORBS-344.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93339.66496175
Element set: 916
Inclination: 98.6049 deg
RA of node: 61.9694 deg
Eccentricity: 0.0011825
Arg of perigee: 41.8303 deg
Mean anomaly: 318.3787 deg
Mean motion: 14.29807962 rev/day
Decay rate: 9.8e-07 rev/day^2
Epoch rev: 20193
Checksum: 343

Satellite: AO-16
Catalog number: 20439
Epoch time: 93339.65804529
Element set: 716
Inclination: 98.6125 deg
RA of node: 63.0007 deg
Eccentricity: 0.0012085
Arg of perigee: 42.4157 deg
Mean anomaly: 317.7990 deg
Mean motion: 14.29864764 rev/day
Decay rate: 9.2e-07 rev/day^2
Epoch rev: 20194
Checksum: 316

Satellite: DO-17
Catalog number: 20440
Epoch time: 93339.70110696
Element set: 716
Inclination: 98.6132 deg
RA of node: 63.3043 deg
Eccentricity: 0.0012255
Arg of perigee: 41.5371 deg
```

Mean anomaly: 318.6771 deg
Mean motion: 14.30002231 rev/day
Decay rate: 9.8e-07 rev/day^2
Epoch rev: 20196
Checksum: 268

Satellite: WO-18
Catalog number: 20441
Epoch time: 93338.69354219
Element set: 717
Inclination: 98.6127 deg
RA of node: 62.3215 deg
Eccentricity: 0.0012830
Arg of perigee: 44.6898 deg
Mean anomaly: 315.5341 deg
Mean motion: 14.29979345 rev/day
Decay rate: 8.0e-07 rev/day^2
Epoch rev: 20182
Checksum: 312

Satellite: LO-19
Catalog number: 20442
Epoch time: 93339.66409654
Element set: 716
Inclination: 98.6135 deg
RA of node: 63.4933 deg
Eccentricity: 0.0013133
Arg of perigee: 41.6454 deg
Mean anomaly: 318.5726 deg
Mean motion: 14.30072336 rev/day
Decay rate: 9.7e-07 rev/day^2
Epoch rev: 20197
Checksum: 305

Satellite: UO-22
Catalog number: 21575
Epoch time: 93339.62142588
Element set: 416
Inclination: 98.4556 deg
RA of node: 52.8408 deg
Eccentricity: 0.0008057
Arg of perigee: 141.7089 deg
Mean anomaly: 218.4692 deg
Mean motion: 14.36870728 rev/day
Decay rate: 1.37e-06 rev/day^2
Epoch rev: 12528
Checksum: 329

Satellite: KO-23
Catalog number: 22077
Epoch time: 93340.41708664

Element set: 313
Inclination: 66.0888 deg
RA of node: 323.5901 deg
Eccentricity: 0.0006335
Arg of perigee: 335.5125 deg
Mean anomaly: 24.5569 deg
Mean motion: 12.86282062 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 6199
Checksum: 281

Satellite: AO-27
Catalog number: 22825
Epoch time: 93340.63744409
Element set: 215
Inclination: 98.6748 deg
RA of node: 53.2005 deg
Eccentricity: 0.0009518
Arg of perigee: 54.0663 deg
Mean anomaly: 306.1406 deg
Mean motion: 14.27594182 rev/day
Decay rate: 1.02e-06 rev/day^2
Epoch rev: 1021
Checksum: 276

Satellite: IO-26
Catalog number: 22826
Epoch time: 93340.21182841
Element set: 216
Inclination: 98.6747 deg
RA of node: 52.7873 deg
Eccentricity: 0.0010063
Arg of perigee: 55.9732 deg
Mean anomaly: 304.2402 deg
Mean motion: 14.27696330 rev/day
Decay rate: 8.9e-07 rev/day^2
Epoch rev: 1015
Checksum: 288

Satellite: KO-25
Catalog number: 22830
Epoch time: 93339.63531252
Element set: 216
Inclination: 98.5753 deg
RA of node: 51.5182 deg
Eccentricity: 0.0012128
Arg of perigee: 27.9533 deg
Mean anomaly: 332.2307 deg
Mean motion: 14.28019941 rev/day
Decay rate: 7.4e-07 rev/day^2
Epoch rev: 1007

```
Checksum: 276

/EX
```

437. ORBS$344.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 16:56:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-344.w.1993@ampr.org>
Source record: 28546
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-344.W
Orbital Elements 344.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX December 10, 1993
BID: $ORBS-344.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93342.70049786
Element set: 616
Inclination: 99.0787 deg
RA of node: 25.7011 deg
Eccentricity: 0.0015669
Arg of perigee: 39.5125 deg
Mean anomaly: 320.7148 deg
Mean motion: 14.13568935 rev/day
Decay rate: 1.40e-06 rev/day^2
Epoch rev: 46343
Checksum: 316

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93341.66264576
Element set: 514
Inclination: 98.5127 deg
RA of node: 351.4956 deg
Eccentricity: 0.0013232
Arg of perigee: 164.2969 deg
Mean anomaly: 195.8610 deg
Mean motion: 14.24848693 rev/day
Decay rate: 1.02e-06 rev/day^2
Epoch rev: 37533
Checksum: 330

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93339.73180874
Element set: 215
Inclination: 82.5444 deg
RA of node: 62.4795 deg
Eccentricity: 0.0016770
Arg of perigee: 9.7264 deg
```

Mean anomaly: 350.4220 deg
Mean motion: 13.84700344 rev/day
Decay rate: 1.02e-06 rev/day^2
Epoch rev: 29558
Checksum: 303

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93341.86495960
Element set: 216
Inclination: 82.5416 deg
RA of node: 99.0732 deg
Eccentricity: 0.0017730
Arg of perigee: 24.3892 deg
Mean anomaly: 335.7990 deg
Mean motion: 13.16962928 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25807
Checksum: 328

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93335.92967935
Element set: 413
Inclination: 99.1530 deg
RA of node: 315.2247 deg
Eccentricity: 0.0011726
Arg of perigee: 331.7228 deg
Mean anomaly: 28.3309 deg
Mean motion: 14.12936228 rev/day
Decay rate: 8.1e-07 rev/day^2
Epoch rev: 26735
Checksum: 302

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93342.55740184
Element set: 216
Inclination: 82.5192 deg
RA of node: 295.8959 deg
Eccentricity: 0.0015793
Arg of perigee: 44.4595 deg
Mean anomaly: 315.7827 deg
Mean motion: 13.84350638 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 24130
Checksum: 329

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93334.69005237

Element set: 917
Inclination: 82.5555 deg
RA of node: 47.4111 deg
Eccentricity: 0.0016898
Arg of perigee: 62.3849 deg
Mean anomaly: 297.9388 deg
Mean motion: 13.16025158 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 19700
Checksum: 312

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93340.51939313
Element set: 716
Inclination: 82.5454 deg
RA of node: 1.5084 deg
Eccentricity: 0.0015399
Arg of perigee: 333.1603 deg
Mean anomaly: 26.8773 deg
Mean motion: 13.84183900 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17396
Checksum: 299

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93340.62144989
Element set: 825
Inclination: 98.8506 deg
RA of node: 1.8125 deg
Eccentricity: 0.0013923
Arg of perigee: 187.7140 deg
Mean anomaly: 172.3805 deg
Mean motion: 14.01341665 rev/day
Decay rate: 1.00e-06 rev/day^2
Epoch rev: 16673
Checksum: 295

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93340.36719227
Element set: 715
Inclination: 82.5252 deg
RA of node: 299.3895 deg
Eccentricity: 0.0011811
Arg of perigee: 226.6138 deg
Mean anomaly: 133.4067 deg
Mean motion: 13.83565526 rev/day
Decay rate: 4.2e-07 rev/day^2
Epoch rev: 16109

Checksum: 302

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93338.45465636
Element set: 621
Inclination: 82.5407 deg
RA of node: 307.2624 deg
Eccentricity: 0.0012656
Arg of perigee: 318.6913 deg
Mean anomaly: 41.3690 deg
Mean motion: 13.16460415 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12573
Checksum: 282

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93335.94780045
Element set: 820
Inclination: 98.6410 deg
RA of node: 2.8806 deg
Eccentricity: 0.0013991
Arg of perigee: 87.7504 deg
Mean anomaly: 272.5281 deg
Mean motion: 14.22339524 rev/day
Decay rate: 1.89e-06 rev/day^2
Epoch rev: 13249
Checksum: 302

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93342.27109633
Element set: 619
Inclination: 82.5596 deg
RA of node: 251.5620 deg
Eccentricity: 0.0013360
Arg of perigee: 318.9520 deg
Mean anomaly: 41.0249 deg
Mean motion: 13.16825457 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11133
Checksum: 281

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93342.51575674
Element set: 216
Inclination: 82.5476 deg
RA of node: 357.5371 deg
Eccentricity: 0.0023727

```
Arg of perigee: 42.6334 deg
Mean anomaly: 317.6642 deg
Mean motion: 13.82993616 rev/day
Decay rate: 3.5e-07 rev/day^2
Epoch rev: 1373
Checksum: 312

/EX
```

438. ORBS$344.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 16:58:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-344.m.1993@ampr.org>
Source record: 28547
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-344.M
Orbital Elements 344.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX December 10, 1993
BID: $ORBS-344.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93343.56114036
Element set: 20
Inclination: 51.6180 deg
RA of node: 58.4213 deg
Eccentricity: 0.0005383
Arg of perigee: 74.5508 deg
Mean anomaly: 285.6216 deg
Mean motion: 15.58960993 rev/day
Decay rate: 1.0605e-04 rev/day^2
Epoch rev: 44645
Checksum: 291

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93343.39583333
Element set: 379
Inclination: 28.4711 deg
RA of node: 14.8965 deg
Eccentricity: 0.0005601
Arg of perigee: 267.3006 deg
Mean anomaly: 145.0087 deg
Mean motion: 14.90298067 rev/day
Decay rate: 2.98e-06 rev/day^2
Epoch rev: 105
Checksum: 290

Satellite: GRO
Catalog number: 21225
Epoch time: 93341.66776924
Element set: 4
Inclination: 28.4617 deg
RA of node: 121.0915 deg
Eccentricity: 0.0031871
Arg of perigee: 286.3791 deg
```

Mean anomaly: 73.2946 deg
Mean motion: 15.46763151 rev/day
Decay rate: 6.624e-05 rev/day^2
Epoch rev: 2736
Checksum: 300

Satellite: UARS
Catalog number: 21701
Epoch time: 93342.65260819
Element set: 418
Inclination: 56.9828 deg
RA of node: 202.5066 deg
Eccentricity: 0.0005874
Arg of perigee: 102.5209 deg
Mean anomaly: 257.6002 deg
Mean motion: 14.96251149 rev/day
Decay rate: 3.629e-05 rev/day^2
Epoch rev: 12240
Checksum: 285

Satellite: POSAT
Catalog number: 22829
Epoch time: 93341.80894716
Element set: 208
Inclination: 98.6692 deg
RA of node: 54.3707 deg
Eccentricity: 0.0010935
Arg of perigee: 37.7065 deg
Mean anomaly: 322.4792 deg
Mean motion: 14.27988203 rev/day
Decay rate: 9.1e-07 rev/day^2
Epoch rev: 1038
Checksum: 313

/EX

439. ORBS$344.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 17:00:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-344.n.1993@ampr.org>
Source record: 28548
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-344.N
2Line Orbital Elements 344.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX December 10, 1993
BID: $ORBS-344.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 78587
UO-11
1 14781U 84021B 93342.66573932 .00000337 00000-0 61232-4 0 6176
2 14781 97.7956 1.2301 0012043 153.7437 206.4353 14.69097732522339
RS-10/11
1 18129U 87054A 93337.45348696 .00000030 00000-0 26350-4 0 8155
2 18129 82.9255 113.5236 0011195 202.4287 157.6376 13.72327170323069
AO-13
1 19216U 88051B 93336.80025401 -.00000119 00000-0 10000-4 0 8216
2 19216 57.8913 280.9905 7209935 329.6810 3.4424 2.09721276 41896
FO-20
1 20480U 90013C 93338.53163149 .00000025 00000-0 82238-4 0 6121
2 20480 99.0174 162.3283 0541196 60.5893 304.8188 12.83222700179161
AO-21
1 21087U 91006A 93338.53066287 .00000084 00000-0 82657-4 0 3737
2 21087 82.9439 286.7581 0033930 267.3519 92.3725 13.74529222142847
RS-12/13
1 21089U 91007A 93340.55801944 .00000035 00000-0 30376-4 0 6170
2 21089 82.9190 154.3003 0028317 286.8165 72.9884 13.74031130142192
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
UO-14
1 20437U 90005B 93339.66496175 .00000098 00000-0 45884-4 0 9160
2 20437 98.6049 61.9694 0011825 41.8303 318.3787 14.29807962201935
AO-16
1 20439U 90005D 93339.65804529 .00000092 00000-0 43650-4 0 7168
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2 20439 98.6125 63.0007 0012085 42.4157 317.7990 14.29864764201949
DO-17
1 20440U 90005E 93339.70110696 .00000098 00000-0 45837-4 0 7166
2 20440 98.6132 63.3043 0012255 41.5371 318.6771 14.30002231201963
WO-18
1 20441U 90005F 93338.69354219 .00000080 00000-0 38594-4 0 7179
2 20441 98.6127 62.3215 0012830 44.6898 315.5341 14.29979345201826
LO-19
1 20442U 90005G 93339.66409654 .00000097 00000-0 45261-4 0 7168
2 20442 98.6135 63.4933 0013133 41.6454 318.5726 14.30072336201979
UO-22
1 21575U 91050B 93339.62142588 .00000137 00000-0 53152-4 0 4163
2 21575 98.4556 52.8408 0008057 141.7089 218.4692 14.36870728125282
KO-23
1 22077U 92052B 93340.41708664 .00000000 00000-0 10000-3 0 3135
2 22077 66.0888 323.5901 0006335 335.5125 24.5569 12.86282062 61993
AO-27
1 22825U 93061C 93340.63744409 .00000102 00000-0 49453-4 0 2157
2 22825 98.6748 53.2005 0009518 54.0663 306.1406 14.27594182 10212
IO-26
1 22826U 93061D 93340.21182841 .00000089 00000-0 43990-4 0 2163
2 22826 98.6747 52.7873 0010063 55.9732 304.2402 14.27696330 10159
KO-25
1 22830U 93061H 93339.63531252 .00000074 00000-0 37772-4 0 2161
2 22830 98.5753 51.5182 0012128 27.9533 332.2307 14.28019941 10076
NOAA-9
1 15427U 84123A 93342.70049786 .00000140 00000-0 84766-4 0 6165
2 15427 99.0787 25.7011 0015669 39.5125 320.7148 14.13568935463439
NOAA-10
1 16969U 86073A 93341.66264576 .00000102 00000-0 51842-4 0 5147
2 16969 98.5127 351.4956 0013232 164.2969 195.8610 14.24848693375336
MET-2/17
1 18820U 88005A 93339.73180874 .00000102 00000-0 85026-4 0 2154
2 18820 82.5444 62.4795 0016770 9.7264 350.4220 13.84700344295589
MET-3/2
1 19336U 88064A 93341.86495960 .00000043 00000-0 10000-3 0 2168
2 19336 82.5416 99.0732 0017730 24.3892 335.7990 13.16962928258071
NOAA-11
1 19531U 88089A 93335.92967935 .00000081 00000-0 53930-4 0 4139
2 19531 99.1530 315.2247 0011726 331.7228 28.3309 14.12936228267351
MET-2/18
1 19851U 89018A 93342.55740184 .00000041 00000-0 31525-4 0 2162
2 19851 82.5192 295.8959 0015793 44.4595 315.7827 13.84350638241300
MET-3/3
1 20305U 89086A 93334.69005237 .00000043 00000-0 10000-3 0 9176
2 20305 82.5555 47.4111 0016898 62.3849 297.9388 13.16025158197009
MET-2/19
1 20670U 90057A 93340.51939313 .00000015 00000-0 79036-5 0 7162
2 20670 82.5454 1.5084 0015399 333.1603 26.8773 13.84183900173965
FY-1/2
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1 20788U 90081A 93340.62144989 .00000100 00000-0 77693-4 0 8250
2 20788 98.8506 1.8125 0013923 187.7140 172.3805 14.01341665166736
MET-2/20
1 20826U 90086A 93340.36719227 .00000042 00000-0 32606-4 0 7150
2 20826 82.5252 299.3895 0011811 226.6138 133.4067 13.83565526161094
MET-3/4
1 21232U 91030A 93338.45465636 .00000043 00000-0 10000-3 0 6211
2 21232 82.5407 307.2624 0012656 318.6913 41.3690 13.16460415125735
NOAA-12
1 21263U 91032A 93335.94780045 .00000189 00000-0 93586-4 0 8205
2 21263 98.6410 2.8806 0013991 87.7504 272.5281 14.22339524132493
MET-3/5
1 21655U 91056A 93342.27109633 .00000043 00000-0 10000-3 0 6192
2 21655 82.5596 251.5620 0013360 318.9520 41.0249 13.16825457111339
MET-2/21
1 22782U 93055A 93342.51575674 .00000035 00000-0 26724-4 0 2169
2 22782 82.5476 357.5371 0023727 42.6334 317.6642 13.82993616 13730
MIR
1 16609U 86017A 93343.56114036 .00010605 00000-0 14006-3 0 203
2 16609 51.6180 58.4213 0005383 74.5508 285.6216 15.58960993446454
HUBBLE
1 20580U 90037B 93343.39583333 .00000298 00000-0 22324-4 0 3791
2 20580 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1056
GRO
1 21225U 91027B 93341.66776924 .00006624 00000-0 11971-3 0 45
2 21225 28.4617 121.0915 0031871 286.3791 73.2946 15.46763151 27365
UARS
1 21701U 91063B 93342.65260819 .00003629 00000-0 33983-3 0 4183
2 21701 56.9828 202.5066 0005874 102.5209 257.6002 14.96251149122408
POSAT
1 22829U 93061G 93341.80894716 .00000091 00000-0 44722-4 0 2081
2 22829 98.6692 54.3707 0010935 37.7065 322.4792 14.27988203 10382
/EX
```

440. * SpaceNews 13-Dec-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 17:32:16 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1213.1993@ampr.org>
Source record: 28549
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

```
SB NEWS @ AMSAT $SPC1213
* SpaceNews 13-Dec-93 *

BID: $SPC1213

=========
SpaceNews
=========

MONDAY DECEMBER 13, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is
published every week and is made available for unlimited distribution.

* MIR NEWS *
============
Jean-Claude, FB1RCI, of Marseille, France has provided a graphical view
depicting the altitude of the Russian space station Mir over the past year
based on the mean motion of the spacecraft:

Rev per day

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/\_______________________________/\_____________________________________/\__
1992 1993 1994

(I = Boost to higher orbit)

* AMSAT-OSCAR-13 NEWS *
======================
AO-13 is now experiencing the longest eclipses it will ever experience,
indeed the longest that ANY amateur satellite has received! The period
affected is Dec 08 - 24. Most eclipses exceed 2 hours, with the longest
136 minutes on Dec 15th.
```

In addition, the Sun angle is -30 degrees and worsening, giving only 86% illumination now, less later. The mode-B transponder is only just sustainable, and is on for the minimum sensible time, MA 180-250 with a break from 220-230 for mode-S exclusive.

There is no guarantee that even this is enough safety margin, and further curtailments may be necessary, including a slight reorienation to collect more sunlight.

The Whole Orbit Data collection in the K-block is presently monitoring battery voltage. The safety threshold is 12.6 volts, when the on-board computer will closedown the transponder if necessary. Bytes 64-191 are voltage at 8 MA intervals, and convert as V = (N-10)*0.0668 volts.

Please be sensitive about your uplink power. Remember, optimum conditions occur at only 30,000 km range now. Compared with apogee that's a 6 db round trip improvement, so you can cut your power by 1/4 and be no worse off.

L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Dec 08-Jan 31
Mode-B : MA 250 to MA 256 ! OFF Dec 08 - 24 | Eclipses, max
Mode-B : MA 0 to MA 180 ! OFF | duration 136
Mode-B : MA 180 to MA 220 ! minutes.
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 250 ! Alon/Alat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
Long eclipses and poor Sun angle now need maximum OFF time.

[Info via James, G3RUH @ GB7DDX.#22.GBR.EU]

* ITAMSAT-OSCAR-16 NEWS *
==========
ITAMSAT-OSCAR-26 suffered a software crash at approximately 11:30 UTC on 08-Dec-93 during a pass over Europe. The crash left the transmitter on with no MBL or telemetry. The satellite was successfully recovered on 09-Dec-93 through a joint effort by Alberto Zagni I2KBD and the Eyesat ground station in the United States. IO-26 was reset to its safe mode (MBL with transmitter off) at about 05:40 UTC.

Alberto, I2KBD, on the first evening pass over Europe was able to switch the transmitter on again, and began some memory dumps in order to gain more information about the software crash. The TX was switched on at 19:00 UTC, and is now sending MBL telemetry.

The ITAMSAT Command Team will probably delay the recommissioning of the BBS on IO-26 to allow a better understanding of the orbital parameters, in order to be able to raise the power when the BBS will be turned on again. Look for any bulletin in the downlink for upcoming WODs.

The ITAMSAT Command Team would like to thank the Eyesat ground station, Jeff Ward G0/K8KA and Harold Price NK6K for their help.

ITAMSAT Command Team can be reached via Internet as i2kbd@amsat.org or ik2ovv@amsat.org, and on Compuserve HAMNET.

[Info via Luca Bertagnolio, IK2OVV, of the ITAMSAT Command Team]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

CT1AJY KD1NV IW2EPE N2IRO NW2L G6CNF

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

441. Space Camp BBS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-10 22:14:38 UTC
From: thureen@cobber.cord.edu
Message-ID: <2easce$f2m@cobber.cord.edu>
Source record: 28551

Some time ago I heard that NASA had created a computer BBS at one of their space camp sites and attached it to the INTERNET somewhere. Can anyone verify this and mail me their INTERNET address?

Thanks
Dan Thureen

thureen@cobber.cord.edu

442. Two-Line Orbital Element Sets (TLE308)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 01:07:39 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755572059@afit.af.mil>
Source record: 28552
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #308 -
Alouette 1
1 00424U 62049 93342.86884070 .00000061 00000-0 68185-4 0 9183
2 00424 80.4642 112.7776 0022556 243.6490 116.2353 13.67789980556381
ATS 3
1 03029U 67111A 93339.54551368 -.00000075 00000-0 10000-3 0 1128
2 03029 14.5206 9.4415 0011931 261.6974 254.2264 1.00273103 95496
Cosmos 398
1 04966U 71016A 93343.70582227 .00145784 30643-4 35444-3 0 8367
2 04966 51.4601 330.4364 1209403 180.1389 179.9936 13.45186284746830
Starlette
1 07646U 75010A 93340.61353434 -.00000029 00000-0 25197-4 0 7149
2 07646 49.8206 193.2746 0206006 60.2748 301.8390 13.82184803951206
LAGEOS
1 08820U 76039A 93341.59436023 -.00000000 00000-0 10000-3 0 9181
2 08820 109.8568 69.9650 0043972 326.1358 33.6547 6.38664717154911
ETS-2
1 09852U 77014A 93325.39294639 .00000069 00000-0 10000-3 0 9090
2 09852 11.7748 44.0376 0003389 22.0749 324.8312 1.00018145 8578
GOES 2
1 10061U 77048A 93339.55818684 .00000112 00000-0 10000-3 0 2256
2 10061 10.8355 48.0691 0002560 24.1656 67.0325 1.00274719 5174
IUE
1 10637U 78012A 93339.21943582 -.00000189 00000-0 10000-3 0 9203
2 10637 34.2980 98.0597 1306735 30.1106 334.7448 1.00265264 10773
GPS BI-01
1 10684U 78020A 93331.28584705 -.00000018 00000-0 10000-3 0 2092
2 10684 64.5359 51.5287 0064487 161.9483 198.3465 1.98079803100925
GPS BI-02
1 10893U 78047A 93323.95661548 -.00000015 00000-0 10000-3 0 16
```

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2 10893 63.6475 291.1096 0209952 13.5918 346.9537 2.01627562113841
GOES 3
1 10953U 78062A 93341.37683101 .00000108 00000-0 10000-3 0 2198
2 10953 9.7606 50.8473 0005556 126.5794 220.6977 1.00254690 9795
SeaSat 1
1 10967U 78064A 93338.88581995 .00000174 00000-0 78716-4 0 2164
2 10967 108.0015 60.1076 0002869 254.4683 105.6157 14.37897135808422
GPS BI-03
1 11054U 78093A 93341.00468162 -.00000017 00000-0 10000-3 0 1136
2 11054 63.3323 287.4323 0043434 175.7687 184.2585 1.93505252110794
Nimbus 7
1 11080U 78098A 93340.61260077 .00000029 00000-0 41978-4 0 3202
2 11080 99.0743 226.1480 0008418 292.5932 67.4474 13.83725398763445
GPS BI-04
1 11141U 78112A 93337.49999999 .00000112 00000-0 00000+0 0 8126
2 11141 64.5300 52.2370 0048963 27.7180 42.6780 1.92893237 03
GPS BI-05
1 11690U 80011A 93332.46740469 -.00000017 00000-0 10000-3 0 7123
2 11690 64.8797 53.3367 0142214 198.1764 161.3495 2.00552800115511
GPS BI-06
1 11783U 80032A 93329.51752110 -.00000018 00000-0 10000-3 0 9131
2 11783 62.7510 285.0371 0208106 29.2253 331.9060 2.03389745 99819
GOES 5
1 12472U 81049A 93334.55507094 .00000131 00000-0 10000-3 0 7071
2 12472 6.4074 60.3248 0004220 0.0229 70.9428 1.00241583 3774
Cosmos 1383
1 13301U 82066A 93341.77622589 .00000023 00000-0 19680-4 0 2172
2 13301 82.9337 90.1062 0026050 262.4617 97.3578 13.68047371571250
LandSat 4
1 13367U 82072A 93342.91707985 .00000198 00000-0 49083-4 0 3884
2 13367 98.2081 39.6148 0007969 119.8624 240.3375 14.57110057606358
IRAS
1 13777U 83004A 93342.55881723 -.00000021 00000-0 -26251-5 0 5228
2 13777 98.9738 172.4257 0012823 117.8576 242.3856 13.99193312224481
Cosmos 1447
1 13916U 83021A 93342.88259793 .00000033 00000-0 28655-4 0 3176
2 13916 82.9454 152.4459 0037307 198.0672 161.9172 13.74299208537194
TDRS 1
1 13969U 83026B 93343.37490566 .00000129 00000-0 10000-3 0 2257
2 13969 7.3256 52.9731 0002112 253.4394 96.1231 1.00284373 12144
GOES 6
1 14050U 83041A 93338.05703867 -.00000195 00000-0 10000-3 0 1170
2 14050 5.2048 63.2181 0002657 304.6700 5.3527 1.00242287 10821
OSCAR 10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 50611
LandSat 5
1 14780U 84021A 93342.40654296 .00000222 00000-0 54372-4 0 9869
2 14780 98.1917 40.6994 0005332 122.9915 237.1819 14.57118732519680
UoSat 2
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1 14781U 84021B 93342.66573932 .00000337 00000-0 61232-4 0 6176
2 14781 97.7956 1.2301 0012043 153.7437 206.4353 14.69097732522339
GPS BI-09
1 15039U 84059A 93340.27472895 -.00000015 00000-0 10000-3 0 1204
2 15039 63.8553 47.0943 0055473 217.8109 141.8465 2.00560954 69475
Cosmos 1574
1 15055U 84062A 93342.73479057 .00000052 00000-0 49431-4 0 5177
2 15055 82.9560 205.4865 0028708 28.6872 331.5851 13.73596818474479
GPS BI-10
1 15271U 84097A 93342.19914792 -.00000018 00000-0 10000-3 0 7236
2 15271 62.4691 284.5546 0140889 346.1774 13.4370 2.00575473 66623
Cosmos 1602
1 15331U 84105A 93339.83342901 .00000873 00000-0 10110-3 0 2164
2 15331 82.5357 258.7317 0021786 117.9398 242.4151 14.84207994495825
NOAA 9
1 15427U 84123A 93342.70049786 .00000140 00000-0 84766-4 0 6165
2 15427 99.0787 25.7011 0015669 39.5125 320.7148 14.13568935463439
GPS BI-11
1 16129U 85093A 93340.44110572 -.00000014 00000-0 10000-3 0 5173
2 16129 64.5994 49.1282 0131510 141.6406 219.3506 2.00563826 6281
Mir
1 16609U 86017A 93343.56114036 .00010605 00000-0 14006-3 0 203
2 16609 51.6180 58.4213 0005383 74.5508 285.6216 15.58960993446454
SPOT 1
1 16613U 86019A 93343.46202979 .00000114 00000-0 62356-4 0 5822
2 16613 98.7127 55.3050 0000891 58.1744 301.9506 14.20042743 89624
Cosmos 1766
1 16881U 86055A 93339.89667257 .00000652 00000-0 78145-4 0 1157
2 16881 82.5170 316.7724 0020244 138.9538 221.3333 14.83238906396805
EGP
1 16908U 86061A 93339.36096697 -.00000025 00000-0 10000-3 0 8157
2 16908 50.0126 320.2962 0011570 180.0654 180.0202 12.44408617332628
NOAA 10
1 16969U 86073A 93341.66264576 .00000102 00000-0 51842-4 0 5147
2 16969 98.5127 351.4956 0013232 164.2969 195.8610 14.24848693375336
MOS-1
1 17527U 87018A 93341.46800024 .00000134 00000-0 12493-3 0 9822
2 17527 99.0604 48.9742 0000845 83.1484 276.9579 13.94893210346201
GOES 7
1 17561U 87022A 93338.16656700 -.00000010 00000-0 10000-3 0 6247
2 17561 1.1244 77.9395 0001952 318.3613 344.4047 1.00268827 8015
Kvant-1
1 17845U 87030A 93342.92008714 .00023915 00000-0 30717-3 0 6588
2 17845 51.6176 61.6462 0006000 71.1334 288.8958 15.58960837446276
DMSP B5D2-3
1 18123U 87053A 93340.51168647 .00000091 00000-0 56230-4 0 1368
2 18123 98.7878 170.0166 0014711 13.1678 346.9883 14.15321484333750
RS-10/11
1 18129U 87054A 93337.45348696 .00000030 00000-0 26350-4 0 8155
2 18129 82.9255 113.5236 0011195 202.4287 157.6376 13.72327170323069
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Meteor 2-16
1 18312U 87068A 93339.55531043 .00000048 00000-0 38291-4 0 2168
2 18312 82.5573 5.4333 0011136 300.5403 59.4673 13.84015414318278
Meteor 2-17
1 18820U 88005A 93339.73180874 .00000102 00000-0 85026-4 0 2154
2 18820 82.5444 62.4795 0016770 9.7264 350.4220 13.84700344295589
DMSP B5D2-4
1 18822U 88006A 93339.54918164 .00000180 00000-0 88042-4 0 2402
2 18822 98.4636 197.2626 0006052 181.9795 178.1380 14.22904724302980
Glonass 34
1 19163U 88043A 93342.43128803 .00000016 00000-0 10000-3 0 8151
2 19163 64.9827 116.8385 0007844 168.6154 191.3918 2.13101874 42593
Glonass 36
1 19165U 88043C 93342.48699718 .00000016 00000-0 10000-3 0 2116
2 19165 64.9692 116.8288 0004211 48.1806 311.8075 2.13103967 43216
METEOSAT 3
1 19215U 88051A 93342.40494015 -.00000218 00000-0 10000-3 0 8195
2 19215 1.3074 74.0605 0003910 227.3941 206.8979 1.00260825 7998
AO-13
1 19216U 88051B 93336.80025401 -.00000119 00000-0 10000-4 0 8216
2 19216 57.8913 280.9905 7209935 329.6810 3.4424 2.09721276 10397
OKEAN 1
1 19274U 88056A 93339.71246466 .00000683 00000-0 84421-4 0 8150
2 19274 82.5154 56.6546 0018444 289.3753 70.5507 14.82025541292425
Meteor 3-2
1 19336U 88064A 93341.86495960 .00000043 00000-0 10000-3 0 2168
2 19336 82.5416 99.0732 0017730 24.3892 335.7990 13.16962928258071
Glonass 39
1 19503U 88085C 93339.22702119 -.00000015 00000-0 10000-3 0 1126
2 19503 65.7240 355.8548 0006708 183.6558 176.3879 2.13101666 40639
NOAA 11
1 19531U 88089A 93335.92967935 .00000081 00000-0 53930-4 0 4139
2 19531 99.1530 315.2247 0011726 331.7228 28.3309 14.12936228267351
TDRS 2
1 19548U 88091B 93338.61190545 -.00000250 00000-0 10000-3 0 8238
2 19548 0.5948 78.8917 0003117 162.0420 350.9316 1.00267281 6259
Glonass 40
1 19749U 89001A 93340.67467023 .00000017 00000-0 10000-3 0 3202
2 19749 64.9386 116.4915 0004161 271.7890 88.1223 2.13100608 38186
Glonass 41
1 19750U 89001B 93339.32378003 .00000016 00000-0 10000-3 0 2111
2 19750 64.9663 116.5905 0006800 244.8635 115.1004 2.13102361 38160
GPS BII-01
1 19802U 89013A 93341.27669458 .00000029 00000-0 10000-3 0 8183
2 19802 55.0842 147.3296 0035005 174.0734 185.9921 2.00568940 35194
Akebono
1 19822U 89016A 93342.62463076 .00017466 00000-0 10506-2 0 1429
2 19822 75.0913 289.6250 3841582 70.2005 326.7784 7.73085208 94501
Meteor 2-18
1 19851U 89018A 93342.55740184 .00000041 00000-0 31525-4 0 2162
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2 19851 82.5192 295.8959 0015793 44.4595 315.7827 13.84350638241300
MOP-1
1 19876U 89020B 93342.29044544 .00000027 00000-0 10000-3 0 7196
2 19876 0.1268 348.5130 0000903 283.8917 269.3194 1.00263714 5164
TDRS 3
1 19883U 89021B 93342.29943377 -.00000232 00000-0 00000+0 0 8226
2 19883 0.0086 217.8028 0002023 349.9262 296.1101 1.00269231 87554
GPS BII-02
1 20061U 89044A 93341.61800092 -.00000028 00000-0 10000-3 0 8219
2 20061 54.7337 324.2554 0125818 205.4382 153.9153 2.00565906 32942
Nadezhda 1
1 20103U 89050A 93341.75723391 .00000048 00000-0 44220-4 0 9184
2 20103 82.9592 68.9377 0039000 101.9788 258.5760 13.73829632222024
GPS BII-03
1 20185U 89064A 93341.45575510 .00000030 00000-0 10000-3 0 8238
2 20185 54.8966 147.9709 0006648 230.2864 129.6623 2.00550368 31510
GMS 4
1 20217U 89070A 93341.72043067 -.00000246 00000-0 10000-3 0 9284
2 20217 0.1269 61.2708 0000497 200.5912 214.1746 1.00277986 16175
GPS BII-04
1 20302U 89085A 93341.98805043 -.00000015 00000-0 10000-3 0 8220
2 20302 53.6670 264.7179 0021257 59.9839 300.9686 2.00560091 30325
Meteor 3-3
1 20305U 89086A 93341.68446159 .00000043 00000-0 10000-3 0 9197
2 20305 82.5544 42.4809 0017556 45.6976 314.4736 13.16024582197926
COBE
1 20322U 89089A 93338.57381686 -.00000217 00000-0 -12745-3 0 9155
2 20322 98.9862 352.1841 0009911 89.3198 270.8439 14.03421236207092
Kvant-2
1 20335U 89093A 93342.92008714 .00023915 00000-0 30717-3 0 7500
2 20335 51.6176 61.6462 0006000 71.1334 288.8958 15.58960837446386
GPS BII-05
1 20361U 89097A 93338.50210962 -.00000004 00000-0 10000-3 0 7173
2 20361 55.4216 90.0352 0071745 103.7865 257.0094 2.00567116 19746
SPOT 2
1 20436U 90005A 93342.51433960 .00000120 00000-0 65161-4 0 6871
2 20436 98.6885 54.5978 0001470 65.3559 294.7770 14.20047002201025
UO-14
1 20437U 90005B 93339.66496175 .00000098 00000-0 45884-4 0 9160
2 20437 98.6049 61.9694 0011825 41.8303 318.3787 14.29807962201935
UO-15
1 20438U 90005C 93338.67145590 .00000053 00000-0 28863-4 0 7160
2 20438 98.6052 60.1703 0010953 47.4126 312.7995 14.29153130201725
PACSAT
1 20439U 90005D 93339.65804529 .00000092 00000-0 43650-4 0 7168
2 20439 98.6125 63.0007 0012085 42.4157 317.7990 14.29864764201949
DO-17
1 20440U 90005E 93339.70110696 .00000098 00000-0 45837-4 0 7166
2 20440 98.6132 63.3043 0012255 41.5371 318.6771 14.30002231201963
WO-18
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1 20441U 90005F 93338.69354219 .00000080 00000-0 38594-4 0 7179
2 20441 98.6127 62.3215 0012830 44.6898 315.5341 14.29979345201826
LO-19
1 20442U 90005G 93339.66409654 .00000097 00000-0 45261-4 0 7168
2 20442 98.6135 63.4933 0013133 41.6454 318.5726 14.30072336201979
GPS BII-06
1 20452U 90008A 93339.90541287 .00000023 00000-0 10000-3 0 8205
2 20452 54.0711 204.3892 0053490 71.9330 288.7337 2.00566561 28262
MOS-1B
1 20478U 90013A 93343.23472209 .00000117 00000-0 10000-3 0 5264
2 20478 99.0577 54.8289 0000870 104.2590 255.9138 13.94889874116161
DEBUT
1 20479U 90013B 93339.89227157 -.00000013 00000-0 -18360-5 0 7136
2 20479 99.0178 163.5121 0541175 57.2995 307.9068 12.83310767179342
FO-20
1 20480U 90013C 93338.53163149 .00000025 00000-0 82238-4 0 6121
2 20480 99.0174 162.3283 0541196 60.5893 304.8188 12.83222700179161
MOS-1B R/B
1 20491U 90013D 93339.64266966 -.00000651 00000-0 -11983-2 0 9180
2 20491 99.0325 202.8314 0470447 301.4910 54.1124 13.02965208181452
LACE
1 20496U 90015A 93342.67317691 .00003428 00000-0 11795-3 0 3208
2 20496 43.1007 51.0112 0012882 219.9615 139.8687 15.31802880212285
Nadezhda 2
1 20508U 90017A 93342.66738929 .00000046 00000-0 42600-4 0 9180
2 20508 82.9546 202.9286 0046039 51.3102 309.2158 13.73464836189397
OKEAN 2
1 20510U 90018A 93339.52790486 .00000437 00000-0 58576-4 0 2165
2 20510 82.5255 4.6907 0020650 101.4459 258.9248 14.78194020203054
INTELSAT-6
1 20523U 90021A 93336.06211420 -.00000206 00000-0 20000-3 0 3194
2 20523 0.0201 350.7119 0000890 247.3427 180.7633 1.00270572 6636
GPS BII-07
1 20533U 90025A 93341.30882454 -.00000027 00000-0 10000-3 0 8198
2 20533 55.0836 324.7280 0040276 83.7643 276.6946 2.00564391 27074
PegSat
1 20546U 90028A 93341.87803626 .00008819 00000-0 23031-3 0 5305
2 20546 94.1129 190.5821 0078472 306.5006 52.8758 15.35681473202865
HST
1 20580U 90037B 93343.39583333 .00000298 00000-0 22324-4 0 3791
2 20580 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1056
MACSAT 2
1 20608U 90043B 93340.60773855 .00000354 00000-0 59767-4 0 9161
2 20608 89.9195 181.3100 0108718 45.0402 315.9627 14.64600233191084
Glonass 44
1 20619U 90045A 93341.98273316 -.00000015 00000-0 00000+0 0 9429
2 20619 65.3439 355.4598 0026216 214.0683 145.8111 2.13102746 27668
Glonass 45
1 20620U 90045B 93343.03981332 -.00000015 00000-0 00000+0 0 9399
2 20620 65.3322 355.4241 0006190 29.6346 330.4454 2.13102695 27712
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Glonass 46
1 20621U 90045C 93339.34958009 -.00000015 00000-0 10000-3 0 6183
2 20621 65.3537 355.5832 0014342 199.4357 160.5495 2.13101234 27630
Kristall
1 20635U 90048A 93342.92008714 .00023915 00000-0 30717-3 0 5479
2 20635 51.6176 61.6462 0006000 71.1334 288.8958 15.58960837446389
ROSAT
1 20638U 90049A 93341.70247148 .00000589 00000-0 48938-4 0 2221
2 20638 52.9852 131.1273 0011485 201.6821 158.3594 15.06511095193202
Meteor 2-19
1 20670U 90057A 93340.51939313 .00000015 00000-0 79036-5 0 7162
2 20670 82.5454 1.5084 0015399 333.1603 26.8773 13.84183900173965
CRRES
1 20712U 90065A 93342.11176664 .00000860 00000-0 80907-3 0 7860
2 20712 17.8024 266.8980 7197331 44.5764 354.4395 2.34867772 21389
GPS BII-08
1 20724U 90068A 93337.63648710 .00000026 00000-0 10000-3 0 7178
2 20724 54.7295 145.8229 0108782 155.6024 204.9216 2.00562423 24429
Feng Yun1-2
1 20788U 90081A 93342.47783412 .00000690 00000-0 47961-3 0 8242
2 20788 98.8541 3.6140 0015035 179.6794 183.8778 14.01389198166989
Meteor 2-20
1 20826U 90086A 93340.36719227 .00000042 00000-0 32606-4 0 7150
2 20826 82.5252 299.3895 0011811 226.6138 133.4067 13.83565526161094
GPS BII-09
1 20830U 90088A 93341.67684133 -.00000006 00000-0 10000-3 0 7186
2 20830 55.3526 87.9572 0068416 106.6855 254.0587 2.00556869 23574
GPS BIIA-10
1 20959U 90103A 93339.58970963 .00000027 00000-0 10000-3 0 6206
2 20959 54.8964 147.6261 0077379 222.2032 137.2119 2.00570795 22122
DMSP B5D2-5
1 20978U 90105A 93340.64879262 .00000253 00000-0 10628-3 0 3437
2 20978 98.7138 38.6118 0079798 11.4545 348.8446 14.32333698157542
Glonass 47
1 21006U 90110A 93338.44217676 .00000015 00000-0 00000+0 0 5488
2 21006 64.9178 115.9333 0060414 186.2020 173.7115 2.13102568 23283
Glonass 48
1 21007U 90110B 93343.31927398 .00000014 00000-0 00000+0 0 6413
2 21007 64.9372 115.8262 0037696 178.3160 181.6777 2.13100884 23385
Glonass 49
1 21008U 90110C 93341.32834857 .00000016 00000-0 00000+0 0 6434
2 21008 64.9194 115.8556 0007652 281.3959 78.5069 2.13099689 23326
INFORMTR-1
1 21087U 91006A 93342.53429228 .00000085 00000-0 82657-4 0 3742
2 21087 82.9454 283.7964 0033891 255.8272 103.9102 13.74529413143391
Cosmos 2123
1 21089U 91007A 93340.55801944 .00000035 00000-0 30376-4 0 6170
2 21089 82.9190 154.3003 0028317 286.8165 72.9884 13.74031130142192
MOP-2
1 21140U 91015B 93338.53726744 -.00000021 00000-0 00000+0 0 6167
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2 21140 0.3331 49.8998 0000707 198.7313 14.6606 1.00190082 5035
Nadezhda 3
1 21152U 91019A 93342.79404611 .00000038 00000-0 33671-4 0 7166
2 21152 82.9244 108.2353 0043115 26.3150 334.0245 13.73491577137251
Glonass 50
1 21216U 91025A 93341.74495995 -.00000015 00000-0 10000-3 0 2131
2 21216 65.0933 355.3055 0011659 215.2070 144.7606 2.13103435 20861
Glonass 51
1 21217U 91025B 93342.27878188 -.00000015 00000-0 10000-3 0 5425
2 21217 65.0870 355.2946 0013777 240.7887 119.1251 2.13101503 20879
Glonass 52
1 21218U 91025C 93342.39410583 -.00000015 00000-0 10000-3 0 1134
2 21218 65.0819 355.2812 0008674 296.7934 63.2720 2.13102585 20869
GRO
1 21225U 91027B 93341.66776924 .00006624 00000-0 11971-3 0 45
2 21225 28.4617 121.0915 0031871 286.3791 73.2946 15.46763151 27365
Meteor 3-4
1 21232U 91030A 93341.41869654 .00000043 00000-0 10000-3 0 6220
2 21232 82.5428 305.1690 0012458 314.5296 45.3677 13.16456987126129
NOAA 12
1 21263U 91032A 93335.94780045 .00000189 00000-0 93586-4 0 8205
2 21263 98.6410 2.8806 0013991 87.7504 272.5281 14.22339524132493
OKEAN 3
1 21397U 91039A 93339.28800053 .00000263 00000-0 36434-4 0 9161
2 21397 82.5260 276.1880 0022443 166.9289 193.2514 14.76064094134908
GPS BIIA-11
1 21552U 91047A 93342.35357779 -.00000009 00000-0 10000-3 0 6264
2 21552 55.6351 85.4606 0052526 234.0905 125.4214 2.00571955 17779
ERS-1
1 21574U 91050A 93341.52789276 .00000215 00000-0 87180-4 0 3372
2 21574 98.5386 53.7747 0001178 84.4656 275.6663 14.32256761125227
UO-22
1 21575U 91050B 93339.62142588 .00000137 00000-0 53152-4 0 4163
2 21575 98.4556 52.8408 0008057 141.7089 218.4692 14.36870728125282
ORBCOMM-X
1 21576U 91050C 93342.74998054 .00000208 00000-0 77989-4 0 5173
2 21576 98.4538 54.9564 0004412 134.5185 225.6440 14.36260321125673
TUBSAT
1 21577U 91050D 93339.65824668 .00000085 00000-0 36112-4 0 4163
2 21577 98.4573 52.3239 0006654 142.2333 217.9356 14.36407778125258
SARA
1 21578U 91050E 93340.66731359 .00000638 00000-0 22183-3 0 6170
2 21578 98.4626 55.6909 0005582 139.6199 220.2247 14.38604939125523
TDRS 4
1 21639U 91054B 93342.17835559 .00000118 00000-0 00000+0 0 6259
2 21639 0.0024 131.7673 0001198 165.8754 29.1575 1.00273660 6653
Meteor 3-5
1 21655U 91056A 93342.27109633 .00000043 00000-0 10000-3 0 6192
2 21655 82.5596 251.5620 0013360 318.9520 41.0249 13.16825457111339
UARS
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1 21701U 91063B 93342.65260819 .00003629 00000-0 33983-3 0 4183
2 21701 56.9828 202.5066 0005874 102.5209 257.6002 14.96251149122408
DMSP B5D2-6
1 21798U 91082A 93342.50159610 .00000170 00000-0 99701-4 0 9960
2 21798 98.9591 342.9284 0012531 322.6521 37.3756 14.13740120104677
Glonass 53
1 21853U 92005A 93339.32191279 .00000015 00000-0 10000-3 0 8153
2 21853 64.8578 115.6337 0006747 194.8252 165.1410 2.13102382 14409
Glonass 54
1 21854U 92005B 93341.96098873 .00000016 00000-0 00000+0 0 8463
2 21854 64.8613 115.5374 0017152 20.8543 339.2006 2.13103048 14442
Glonass 55
1 21855U 92005C 93342.95983657 .00000014 00000-0 00000+0 0 8409
2 21855 64.8700 115.5150 0006900 194.2836 165.6413 2.13102152 14440
JERS-1
1 21867U 92007A 93342.46439811 .00001830 00000-0 15709-3 0 1437
2 21867 97.6619 55.8557 0000593 82.4548 277.6678 14.98691683 99812
GPS BIIA-12
1 21890U 92009A 93340.31772589 -.00000013 00000-0 10000-3 0 4186
2 21890 54.2461 264.7017 0056567 159.9035 200.3460 2.00559229 13106
GPS BIIA-13
1 21930U 92019A 93327.06663126 -.00000028 00000-0 10000-3 0 4169
2 21930 55.5092 26.0894 0047489 174.8373 185.2519 2.00562949 11771
EUVE
1 21987U 92031A 93339.23467830 .00003063 00000-0 13741-3 0 2198
2 21987 28.4346 274.7089 0010065 16.3625 343.7575 15.17868855 82882
SAMPEX
1 22012U 92038A 93339.61048308 .00003018 00000-0 25949-3 0 4232
2 22012 81.6727 14.5818 0116993 309.9271 49.2041 14.91907315 77461
GPS BIIA-14
1 22014U 92039A 93342.05886541 .00000025 00000-0 10000-3 0 3197
2 22014 54.9168 205.3593 0082647 294.7460 64.4780 2.00571297 3904
Glonass 56
1 22056U 92047A 93340.51443858 -.00000016 00000-0 00000+0 0 7393
2 22056 64.9289 355.5839 0007553 270.6222 89.3401 2.13103333 10492
Glonass 57
1 22057U 92047B 93342.21597032 -.00000015 00000-0 00000+0 0 7420
2 22057 64.9411 355.5421 0011311 307.8904 52.0520 2.13102950 10532
Glonass 58
1 22058U 92047C 93341.21855739 -.00000016 00000-0 00000+0 0 7477
2 22058 64.9363 355.5837 0015520 286.9094 72.9699 2.13103106 10535
TOPEX
1 22076U 92052A 93343.39305123 -.00000001 00000-0 10000-3 0 6750
2 22076 66.0423 325.2223 0007970 265.1875 94.8234 12.80930969 62180
KITSAT-A
1 22077U 92052B 93340.41708664 .00000000 00000-0 10000-3 0 3135
2 22077 66.0888 323.5901 0006335 335.5125 24.5569 12.86282062 61993
S80/T
1 22078U 92052C 93339.45671517 .00000000 00000-0 10000-3 0 3134
2 22078 66.0897 325.0937 0007354 342.8234 17.2538 12.86563750 61939
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TOPEX R/B
1 22079U 92052D 93340.45692567 -.00000002 00000-0 10000-3 0 3138
2 22079 66.0729 338.4918 0076051 283.7139 75.5413 12.77662235 61722
GPS BIIA-15
1 22108U 92058A 93340.02831130 -.00000013 00000-0 10000-3 0 3188
2 22108 54.4635 265.3695 0104621 133.1071 227.8030 2.00569485 9042
FREJA
1 22161U 92064A 93340.67397845 .00000380 00000-0 22436-3 0 3176
2 22161 63.0096 59.6381 0775288 298.1291 54.3623 13.21696030 56352
LAGEOS II
1 22195U 92070B 93341.45060035 -.00000004 00000-0 10000-3 0 2172
2 22195 52.6449 214.8726 0138060 33.8421 327.0879 6.47294068 26527
GPS BIIA-16
1 22231U 92079A 93335.72751351 .00000026 00000-0 10000-3 0 3199
2 22231 54.7252 206.8785 0038431 294.6947 64.9601 2.00564931 7545
GPS BIIA-17
1 22275U 92089A 93341.85143610 .00000025 00000-0 10000-3 0 3225
2 22275 54.6723 204.1842 0045041 256.1524 103.4091 2.00555026 7063
TDRS 5
1 22314U 93003B 93341.25225395 -.00000244 00000-0 10000-3 0 3191
2 22314 0.6830 72.1249 0001231 209.8308 198.8814 1.00279223 3405
GPS BIIA-18
1 22446U 93007A 93329.46300176 -.00000026 00000-0 10000-3 0 3155
2 22446 54.7618 325.6369 0069765 336.9609 22.7446 2.00552724 5843
Glonass 59
1 22512U 93010A 93342.13801784 .00000015 00000-0 00000+0 0 4404
2 22512 64.8752 115.3709 0008843 190.5663 169.4059 2.13102078 6043
Glonass 60
1 22513U 93010B 93341.14018538 .00000016 00000-0 00000+0 0 4504
2 22513 64.8719 115.4279 0007482 195.2713 164.6985 2.13102768 6216
Glonass 61
1 22514U 93010C 93339.49847084 .00000015 00000-0 00000+0 0 4369
2 22514 64.8823 115.4689 0013949 185.2816 174.6943 2.13102001 6187
ASTRO-D
1 22521U 93011A 93339.67782224 .00001816 00000-0 15500-3 0 2174
2 22521 31.1045 210.9851 0076561 1.8405 358.2869 14.92752493 43146
UHF F1
1 22563U 93015A 93342.19955472 .00000048 00000-0 10000-3 0 2123
2 22563 26.9834 302.5991 0009239 297.7400 158.3341 0.99248193 6942
GPS BIIA-19
1 22581U 93017A 93337.08630032 -.00000024 00000-0 10000-3 0 2225
2 22581 55.0148 25.5166 0041535 32.0834 328.2555 2.00576467 5019
ProgressM17
1 22588U 93019A 93343.47041932 .00018442 00000-0 15917-3 0 3695
2 22588 51.6184 51.7918 0003941 62.7972 297.4066 15.69292688 39533
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
GPS BIIA-20
1 22657U 93032A 93341.20271968 -.00000026 00000-0 00000+0 0 2131
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2 22657 55.0472 25.1509 0059832 194.9625 164.9065 2.00571802 424
GPS BIIA-21
1 22700U 93042A 93341.67198804 -.00000015 00000-0 10000-3 0 2176
2 22700 54.6349 266.0008 0025590 308.6162 51.1827 2.00571852 3246
Soyuz TM-17
1 22704U 93043A 93342.92008714 .00023915 00000-0 30717-3 0 2529
2 22704 51.6176 61.6462 0006000 71.1334 288.8958 15.58960837446388
NOAA 13
1 22739U 93050A 93342.73391224 .00000160 00000-0 10987-3 0 2147
2 22739 98.9265 283.0925 0009251 302.2347 57.7978 14.10867599 17091
GPS BIIA-22
1 22779U 93054A 93342.25749207 -.00000028 00000-0 10000-3 0 2296
2 22779 54.8913 325.0039 0028390 231.9459 127.8683 2.00558115 2000
Meteor 2-21
1 22782U 93055A 93342.51575674 .00000035 00000-0 26724-4 0 2169
2 22782 82.5476 357.5371 0023727 42.6334 317.6642 13.82993616 13730
SPOT 3
1 22823U 93061A 93342.69611788 .00000194 00000-0 10000-3 0 2231
2 22823 98.7365 54.8791 0000766 79.8460 280.2769 14.20030710 10456
STELLA
1 22824U 93061B 93340.66220271 .00000024 00000-0 18147-4 0 2154
2 22824 98.6778 53.2034 0007352 53.8430 306.3462 14.27094001 10218
KO-25
1 22825U 93061C 93340.63744409 .00000102 00000-0 49453-4 0 2157
2 22825 98.6748 53.2005 0009518 54.0663 306.1406 14.27594182 10212
POSAT-1
1 22826U 93061D 93340.21182841 .00000089 00000-0 43990-4 0 2163
2 22826 98.6747 52.7873 0010063 55.9732 304.2402 14.27696330 10159
HEATHSAT
1 22827U 93061E 93340.55720077 .00000093 00000-0 45629-4 0 2784
2 22827 98.6722 53.1197 0010025 42.2946 317.9015 14.27797190 10192
ITAMSAT
1 22828U 93061F 93340.20681044 .00000149 00000-0 68398-4 0 2158
2 22828 98.6701 52.7707 0010251 45.1549 315.0453 14.27797954 10153
EYESAT-1
1 22829U 93061G 93341.80894716 .00000091 00000-0 44722-4 0 2081
2 22829 98.6692 54.3707 0010935 37.7065 322.4792 14.27988203 10382
1993 061H
1 22830U 93061H 93339.63531252 .00000074 00000-0 37772-4 0 2161
2 22830 98.5753 51.5182 0012128 27.9533 332.2307 14.28019941 10076
GPS BIIA-23
1 22877U 93068A 93339.31750341 -.00000006 00000-0 10000-3 0 186
2 22877 55.0878 86.2399 0029784 280.6004 79.0586 2.00559658 834
Gorizont 29
1 22907U 93072A 93341.50010895 -.00000306 00000-0 00000+0 0 203
2 22907 1.4353 278.2613 0006507 232.9449 235.1811 1.00271225 199
1993 072D
1 22910U 93072D 93337.50295913 -.00000099 00000-0 10000-3 0 101
2 22910 1.4746 278.4522 0014253 15.7060 204.3243 1.03166827 150
Sodaridad 1
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1 22911U 93073A 93340.38786349 -.00000035 00000-0 10000-3 0 235
2 22911 0.0179 276.1468 0008695 355.9405 193.8186 1.00281357 235
Meteosat 6
1 22912U 93073B 93341.24190448 -.00000059 00000-0 00000+0 0 153
2 22912 1.3229 269.1661 0001324 120.3889 119.8393 1.00345141 202
1993 073C
1 22913U 93073C 93343.14111485 .00073013 66228-5 45285-2 0 42
2 22913 6.7035 248.0578 7341807 192.5647 126.8722 2.23643272 412
1993 073D
1 22914U 93073D 93343.83010068 .00090356 00000-0 87110-2 0 47
2 22914 6.9111 245.5636 7275974 195.1660 112.4266 2.31086157 441
USA 97
1 22915U 93074A 93332.80311691 -.00011636 81101-4 00000+0 0 17
2 22915 26.4385 243.9600 7304669 177.6472 190.6535 2.34662354 06
STS 61
1 22917U 93075A 93343.39583333 .00000298 00000-0 22324-4 0 249
2 22917 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1052
HST Array
1 22920U 90037C 93343.31724479 .00013336 00000-0 12188-2 0 93
2 22920 28.4713 15.3748 0005153 66.7755 293.3908 14.93622839 1035
1993076A
1 22921U 93076A 93344.11987175 -.00004492 00000-0 -13662+0 0 48
2 22921 23.1321 267.7054 7122043 167.8854 228.0715 2.23682406 52
1993076B
1 22922U 93076B 93342.31779836 .00000470 00000-0 10000-4 0 28
2 22922 23.0407 254.2560 1186600 105.8444 268.1157 13.12407054 37
1993076C
1 22923U 93076C 93344.11987175 -.00000596 00000-0 -18768-1 0 45
2 22923 23.2731 267.6259 7107098 167.9226 230.7856 2.24042679 52
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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443. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 01:09:50 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755572190@afit.af.mil>
Source record: 28553

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93343.39583333 .00000298 00000-0 22324-4 0 3791
2 20580 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1056
STS 61
1 22917U 93075A 93343.39583333 .00000298 00000-0 22324-4 0 249
2 22917 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1052
HST Array
1 22920U 90037C 93343.31724479 .00013336 00000-0 12188-2 0 93
2 22920 28.4713 15.3748 0005153 66.7755 293.3908 14.93622839 1035
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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444. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 01:10:06 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755572206@afit.af.mil>
Source record: 28554
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93343.39583333 .00000298 00000-0 22324-4 0 3791
2 20580 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1056
STS 61
1 22917U 93075A 93343.39583333 .00000298 00000-0 22324-4 0 249
2 22917 28.4711 14.8965 0005601 267.3006 145.0087 14.90298067 1052
HST Array
1 22920U 90037C 93343.31724479 .00013336 00000-0 12188-2 0 93
2 22920 28.4713 15.3748 0005153 66.7755 293.3908 14.93622839 1035
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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
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445. Re: Two-Line Element Set Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 04:54:58 UTC
From: Dave <HARTRUM@delphi.com>
Message-ID: <931210.86098.HARTRUM@delphi.com>
Source record: 28555

Your message on two-line element set questions was very informative. Where can one find more information about the SGP4 orbital model and algorithms for computing satellite positions based on this model?

Dave Hartrum
hartrum@delphi.com or 71664.1743@compuserve.com

446. wanted macGEPSAL and macSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 15:05:06 UTC
From: bentrup@cs.uiuc.edu
Message-ID: <CHvLwI.1oI@cs.uiuc.edu>
Source record: 28556

Can someone tell me how I might obtain/order a copy of MacGEPSAL and
MacSat? MacSat plots satellite tracks and MacGEPSAL makes polar
coordinate plots of satellite paths with respect to a given spot.
(They probably do more, but that's all I know about them.)

Thanks.
John

--
John A Bentrup INTERNET: bentrup@CS.UIUC.EDU
Biosignals Intelligence Group BITNET: bentrup%uiucdcs.BITNET
Department of Computer Science
University of Illinois at Urbana-Champaign
2413 Digital Computer Lab MC258
1304 W Springfield Ave

447. Re: Free Radio Bands Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 15:43:30 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Dec11.154330.20077@ke4zv.atl.ga.us>
Source record: 28557

In article <CHrzHw.Bp9@murdoch.acc.Virginia.EDU> mb7s@fermi.clas.Virginia.EDU (Mikhail Boukhny) writes:
>Someone has asked me recently what if he wants to build a competing network
>for cellular phones. Are there any gaps yet in the bandwidth? Whom should he
>ask to? Federal Communication Commission? Any information would be appreciated.

The FCC allocated two systems per service area, 400 channels each. One goes to the wireline carrier, and the other goes to the non-wireline carrier. All of the urban systems have been allocated and built, and the last RSA, rural service area, is being built out now east of the Mississippi. There might be a slot available in Idaho or Utah that isn't filled yet, but I doubt it.

There's a new service, PCS, that's a sort of micro-cellular system on new frequency allocations in the 1.8 GHz area. The FCC plans to hold an *auction* to sell allocations for this service. If you had a *lot* of money, you might be able to get in on this.

Gary
--
Gary Coffman KE4ZV | I kill you, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | You kill me, | uunet!rsiatl!ke4zv!gary
534 Shannon Way | We're the Manson Family | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -sorry Barney |

448. Re: Some satellite tracking questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 15:46:23 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Dec11.154623.20161@ke4zv.atl.ga.us>
Source record: 28558

In article <CHrr26.H6A@cbnewsh.cb.att.com> wa2sff@cbnewsh.cb.att.com (joseph.e.wilkes) writes:
>What are people's opinions on the following:
>
>1) What is a good satellite tracking program?
>
>I have been evaluating traksat and I am close to sending in
>my registration fee.
>I have also seen ads for Instanttrack from AMSAT and Realtrak
>from R Meyers. Are either of these two better and why?
>Should I have more than one, if so why?

IT is the way to go. Not only is it a neat program, but the revenues from it go directly into the AMSAT satellite fund. It's a primary fundraiser for the amateur satellite community. Buy a copy.

Gary
--
Gary Coffman KE4ZV | I kill you, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | You kill me, | uunet!rsiatl!ke4zv!gary
534 Shannon Way | We're the Manson Family | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -sorry Barney |

449. Re: Mode-A Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-11 15:57:06 UTC
From: gary@ke4zv.atl.ga.us
Message-ID: <1993Dec11.155706.20259@ke4zv.atl.ga.us>
Source record: 28559

In article <CHruyt.Ktx@rd1.InterLan.COM> tavernin@sun1.interlan.com (Victor Tavernini) writes:
>
>I have a couple of questions about Mode-A on RS-10/11 and RS-12/13 ...
>
>1. Is a 10M preamp usually necessary?

If you have a late model transceiver, no. Only if you have an older radio whose sensitivity falls off on 10 meters is a preamp necessary. With good coax, line loss will be negligible.

>2. Is CW used at all on this mode ... or does SSB predominate?

Morse is probably at least as common as SSB on this satellite.

>3. How much power do I need on the uplink and what type of antenna?

An ERP in the 50-500 watt range is fine, with lower values almost always sufficient. You don't want to be stronger than the beacon. How you get that ERP, whether by transmitter power or antenna gain is your choice. If you already have a beam for other satellites, you can use that. Or you can pump out 100 watts into an omni antenna and do fairly well.

>4. Is it practical at all to key the mike, of an FM rig, to produce CW
> for the uplink?

Sometimes with some radios, if you key relatively slowly. Usually you'll want to go into the radio and arrange to key the driver stage instead. That'll allow the oscillator to run continously rather than waiting for PLL lockup, leave the transmitter stabilized at power, and avoid the TR delay. Of course disconnect the mike when using Morse or you'll have room noise being transmitted.

Gary
--
Gary Coffman KE4ZV | I kill you, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | You kill me, | uunet!rsiatl!ke4zv!gary
534 Shannon Way | We're the Manson Family | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | -sorry Barney |

450. Re: Dealing with Doppler Shift?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-12 03:18:08 UTC
From: esj@harvee.billerica.ma.us
Message-ID: <H.eg.soAEv0Z&PJA@harvee.billerica.ma.us>
Source record: 28560

In <kerskine.10.0@ftp.com>, Keith Erskine writes:
>In article <2e9vkd$8jr@oak.oakland.edu> prvalko@vela.acs.oakland.edu (prvalko) writes:
>
>>The way I understand it, one uses the satellites such that the LOWER
>>frequency never gets adjusted. i.e. on RS-10/11 you tune the 145
>>transmitter so that the 29 MHz receive frequency stays put.
>
>That's right. If you start moving your downlink frequency on your receiver,
>not only do you create a lot of frustration, but you can interfere with other
>QSOs

let me see if I got this right. while I am transmitting on 145.xxx, I
listen on 29.yyy for my signal and adjust my tx frequency to keep my
rx frequency constant?

--- eric
--
HOME: esj@harvee.billerica.ma.us HAM ka1eec
WORK: esj@temerity.polaroid.com 617.386.4687
source of the public's fear of the unknown since 1956

451. Re: Dealing with Doppler Shift?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-12 14:51:39 UTC
From: prvalko@vela.acs.oakland.edu
Message-ID: <2efb5r$6gj@oak.oakland.edu>
Source record: 28211

Yup. That's the way I read it... and that's how I've been operating.

C U on RS-10/11!

=paul= wb8zjl

BTW... on this morning's 3:30 AM pass (insomnia) someone was calling me
by keying the mike on their 2M FM rig. I could-a work him/her if their
CW keying skills had been a smidge better...

452. New To Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-12-12 16:01:41 UTC
From: WARNERMA@VAX1.ELON.EDU
Message-ID: <2eff95$nu@lester.appstate.edu>
Source record: 28212

Hello everyone.

Just a quick question. I'm have been tracking amateur satellites for about a year or so, listening to SAREX and the like with the shuttle, listening to beacons on other birds.

I'm interested in doing a little QSO work with these birds, but I can't seem to locate a book or anything with all the frequencies and information on the basics. Can anyone suggest a file to FTP or book to get that would explain much of it to me?

Thanks in advance...

Matt Warner, kc4yls
warnerma@vax1.elon.edu

453. Weather Satellite Radio Report 1/1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-12 17:59:00 UTC
From: leo.wikholm@compart.fi
Message-ID: <1f.39.1818.0NC5AADA@compart.fi>
Source record: 28216

```
************************************
WEATHER SATELLITE RADIO REPORT 1/1993
************************************

December 12, 1993. Helsinki, Finland.
Finnish Weather Satellite Group

Status of polar-orbiting weather satellites:

satellite frequency status
=========================================================================
NOAA 9 137,620 MHz after 17 UT. 2 x IR pictures
NOAA 10 137,500 MHz normal
NOAA 11 137,620 MHz normal. 2 x IR pictures after 14.40 UT
NOAA 12 137,500 MHz normal
METEOR 2-21 137,400 MHz not active. weak signal in Sep 93
METEOR 3-3 137,300 MHz occasional
METEOR 3-5 137,300 MHz normal + additional data signal (*
=========================================================================

*) Meteor 3-5 sends normal visible channel pictures. When the satellite
crosses +60N latitude the additional data signal is detected.

Please send your observations or comments to:

Leo Wikholm
internet: leo.wikholm@compart.fi
FidoNet : 2:220/861
```

454. ANS-345 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 00:19:59 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-345.01.1993@ampr.org>
Source record: 28213
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-345.01
AO-13 FACES LONG ECLIPSE PERIODS

HR AMSAT NEWS SERVICE BULLETIN 345.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.01

AO-13 Experiences Long Solar Eclipse Which Affect Transponder Operations
James Miller (G3RUH) of the AO-13 Command Team reports that because of the long duration of the solar eclipse periods that AO-13 is experiencing, they have been forced to severely curtail transponder operations. Some of the eclipse periods have been as long as 2 hours. Battery bus voltage has become so low that the net affect has been that there has been no battery charging from orbit to orbit. The safety threshold on the battery bus voltage is currently set 12.6 volts. When the bus voltage drops below 12.6 volts, the on-board computer shuts down the beacon and brings all the other subsystems on AO-13 to a "low-power" state. Currently, with the trans-ponders and telemetry beacons turned-off, the total current consumption on AO-13 is around 1 ampere. In attempt to remedy this low battery voltage problem, the Command Team has made an spacecraft attitude re-adjustment to Bahn Longitude 245 degrees and a Bahn Latitude of -5 degrees. But under the current solar eclipse circumstances, even this has not been sufficient to solve the problem of low battery voltage. So it was necessary to take even further steps including turning off all transponder operations on AO-13 until between Friday December 10 and Monday December 13, 13-DEC-93 around 03:28 UTC. It is hoped that this will bring AO-13 through this difficult time period, however, there is no guarantee that the above actions will be enough. It should be noted that AO-13's batteries are now 5 years old and the Command Team feels that is may be necessary to take a close look at the battery charging software and presets to determine if they need to be adjusted for the age of the batteries.

It is requested that all AO-13 users keep a close "ear" to the telemetry beacons which can be heard on a downlink frequency 145.812 MHz or 2400.646 MHz for the latest information on the transponder schedule.

The Command Team is always interested in hearing from the user any "constructive feedback" about AO-13 transponder operations.

The AO-13 Command Team ccurrnetlu consists of the following:

Peter DB2OS @ DB0FAU
James G3RUH @ GB7DDX
Graham VK5AGR @ VK5WI

[The AMSAT News Service (ANS) would like to thank G3RUH for the information which went into this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-345.02
IO-26 SUFFERS OBC CRASH

HR AMSAT NEWS SERVICE BULLETIN 345.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.02

IK2OVV Explains the IO-26 On-Board-Computer (OBC) Crash

After 45 days of uninterrupted BBS service on IO-26, on 8-DEC-93 at approximately 11:30 UTC, ITAMSAT IO-26 suffered a crash during a pass over Europe. IO-26 is now in an undefined status, with its trasmitter on but no MBL telemetry; the Command Team will try to regain control of the satellite in the next passes over Europe. The cause of the crash is still unclear; the Command Team is investigating on some new software used to access the BBS services. In the past, some other MICROSATs crashes were due to bugs found in the user software. ITAMSAT Command Team, while recommending users not to uplink to the satellite at this time, would like to receive reports about IO-26, especially regarding the presence of just the HDLC flags on the downlink or some sort of telemetry, either MBL or PHT style. However, after examining the memory dumps taken from IO-26, Alberto Zagni (I2KBD) and Harold Price (NK6K) have decided to begin the uploading of the high-level software to restore IHT (ITAMSAT Housekeeping Task) capability. The cause of the crash is still unknown; I2KBD and NK6K are working on the memory dumps, but the crash destroyed part of the internal logs kept by the high-level software. Since the crash happened as one of the Ground Command Stations in Milan was uplinking to the satellite using a new ground software (which has not yet been fully tested), there is chance that this was the cause of the crash. The ITAMSAT Command Team has decided not to turn the BBS on after the reloading of the software; the Team will start some Whole Orbit Data (WOD) collection in order to fully optimize the energy budget onboard the satellite. This will enable IO-26 to have higher power settings on the downlink. It is estimated that the high-level software will be working by this soon; stay tuned on the downlink for any news!

The ITAMSAT Command Team would like to thank again Harold Price (NK6K) for the great help in debugging the memory dumps and the Eyesat Command Team for helping during the initial recovery.

ITAMSAT Command Team can be reached via Internet as i2kbd@amsat.org or ik2ovv@amsat.org, and on Compuserve HAMNET.

73 de Luca Bertagnolio IK2OVV
ITAMSAT Command Team

/EX
SB SAT @ AMSAT $ANS-345.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 345.03 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-345.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 345.04 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.04

Weekly OSCAR Status Reports: 11-DEC-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
[G3RUH/DB2OS/VK5AGR]

FO-20: The following is the FO-20 operating schedule:
Analog mode: 15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC

Digital mode: otherwise noted above. [JJ1WTK]

IO-26: ITAMSAT sufferred a system crash after 45 days of flawless operations. The command team is gathering data to try to determine the source of the problem. They state that the transmitter is on, but the BBS is not open.

AO-16: Operations are normal. [WH6I]

LO-19: Operations are normal. [WH6I]

KO-23: Functioning normally. There have been some questions regarding image files. When WH6I see some images on KITSAT, he trys to list them, but files on that satellite are only active for maybe 5-6 days depending on how much new material is uploaded. Therefore, by the time this status report makes it to the ANS status report, the files may be gone. Satellite image files on KITSAT have names in the form KAI?xxxx where ? is either W or N to indicate a WIDE or NARROW view image. The "xxxx" is a serial number. These files are about 350Kbytes large and can be seen in the directory in PB by hitting F4 to see the list of files generated by the satellite. They are usually in pairs with a wide and narrow view file. These files are downloaded just like anyother file. The program DISPLAY which is often up on the birds willdisplay these images, and it will display whatever there is in the xxxx.ACT file of the image, so that you can look at a partial download and decide if it is worth pursuing. [WH6I]

RS-10: After a period of inactivity, the RS-10 QSO robot is QRV again. The downlink is approx 29.403 MHz, and uplink is +/- 145.820 MHz. If you are "into" the robot receiver, your CW from the few KHz wide passband will be retransmitted on the robot's fixed frequency. The speed of your CW response is not important; it just needs to be steadily and cleanly sent. K0BJ notes that he just changed from a vertical dipole to a J-pole. It seems so far to be about as bad with QSB as the dipole, but the J-pole did seem to peak more in the longer, low-elevation parts of the pass. The next experiment K0BJ will perform is with a turnstile antenna.

POSAT: CT1ENQ would like to inform that the Portuguese satellite (POSAT) is now prepared for amateur radio use. Please contact Portuguese AMSAT group, AMSAT-PO, for more information.

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

455. Re: Free Radio Bands Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 05:05:56 UTC
From: trier@odin.ins.cwru.edu
Message-ID: <2egt7k$2p8@usenet.INS.CWRU.Edu>
Source record: 28214

Recently, _Fortune_ or _Forbes_ ran an article on Motorola that mentioned another competitor to conventional cellular -- at least one company that had a license for taxi dispatching frequencies was planning to convert them over to cellular, making them a third cellular service in their area.

The article was kind of short on details, since it was about Motorola's competitive approach to business, not alternative cellular providers. It was not clear how much bandwidth the company had in those former taxi-dispatch frequencies.

Stephen

--
Stephen Trier KB8PWA "The light at the end of the tunnel
Work: trier@ins.cwru.edu may be an oncoming dragon"
Home: sct@po.cwru.edu - Unknown

456. APT-Satellites: Report DEC 11, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 08:27:41 UTC
From: peter.henne@gmd.de
Message-ID: <1993Dec13.082741.21537@gmd.de>
Source record: 28215
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, DEC 11, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 ?? *
Meteor 3-3: APT 137.30 *OFF*
Meteor 3-5: APT 137.30 On

NOAA-10 APT is off due to VHF-conflict with NOAA-12.
Meteor 3-3 approaches morning terminator, APT is off.
Meteor 2-21 too orbits around the day/night-boundary,
but Mike Kenny (Bureau of Meteorology, Melbourne, Australia)
received APT on DEC 08.
Meteor 3-5 transmits good vis-APT from noon-ascending passes,
but still uses 20 lpm-format for IR-imaging from dark parts
of the orbit (channel-switching occures at 65 deg NLat now).

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

457. Nasa space link

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 16:20:37 UTC
From: normd@zimmer.CSUFresno.EDU
Message-ID: <CHzEqD.3FF@zimmer.CSUFresno.EDU>
Source record: 28218

It appears that the telnet number for the Space link has changed.(I can't get in.) could someone please give me the verbose address as I have lost it, or at least the new telnet number. Thanks Norm.

norm_davis@zimmer.CSUFresno.edu

458. DOVE Transmitting?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 16:26:14 UTC
From: billg@sc.hp.com
Message-ID: <2ei536$fco@hpscit.sc.hp.com>
Source record: 28217

I've been away from amateur radio awhile as my HT batteries died and I never replaced them. What I want to know is, is the DOVE microsat still transmitting? Did they ever get the voice portion of the transmission working? At what time does it pass near enough to the San Francisco bay area for me to hear it? I've been listening for it for several days now for hours at a time at random portions of the day and have heard nothing. I have not been monitoring in the middle of the night however.

Thanks!!

- Bill G

459. Re: Free Radio Bands Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 17:27:17 UTC
From: roesler@c1mpls.mn.org
Message-ID: <CHzHtH.F1I@c1mpls.mn.org>
Source record: 28220

mb7s@fermi.clas.Virginia.EDU (Mikhail Boukhny) writes:
: Someone has asked me recently what if he wants to build a competing network
: for cellular phones. Are there any gaps yet in the bandwidth? Whom should he
: ask to? Federal Communication Commission? Any information would be appreciated.

No such luck, Mike. There are some upcoming initiatives before the FCC regarding spectrum expansion for wireless LAN networks, PCS, and digital messaging, etc., but nothing that's available for the public. Any new spectrum allocation will almost certainly br accompanied by a license lottery, for which the applicant must post significant bond as proof of his/her ability to build a system.

SMR, which was more akin to the older style 'mobile operator' phone system has undergone significant chages in the last few years, and is very cellular-like, although you don't really use cells, and roaming options are quite limited. SMR operators are employing these systems on the existing SMR spectrum.

PCS is also getting a lot of attention, but the existing cellular carriers are making great strides at providing these services given their existing equipment.

I would say your friend's cash is a lot safer in the bank than it is trying to create a new communications competitor. You're better off investing in one of the existing options- getting new spectrum for your own project would cost millions and require at least 5 years of paperwork.

(My thoughts, not my employer's, who obviously disagreed with me)
--
****
* Max Roesler | roesler@loki.ncent.mccaw.com *
* EIS Project Manager | Minneapolis, MN; (612) 832-7653 *
* McCaw Communications | PP-ASEL (C172); N0RGH (EN34/35) *

460. Re: Dealing with Doppler Shift?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 19:45:55 UTC
From: etjfonte@ci.ua.pt
Message-ID: <CHzo8n.9GJ@brigite.ci.ua.pt>
Source record: 28219

You can Work it also on RS12/13.In this one the UPLINK is on 21 and
DOWNLINK on 29Mhz....The dopler is a funny thing.
In many AMSAT meetings you can hear them saying :
X-Newsreader: TIN [version 1.1 PL8]

"Is like being stopped near a railroad and train passing by
making noise.If you give attention to the noise is not always the
same.It's a variable frequency but the diference is very small..
"

Sorry for English ....

If you work Birds you have to be with RIT on to get the other
station fine....

============
= CT1ENQ =
============

Best 73's , good DXing !!...

CT1ENQ - Jose' Miguel MBF Aveiro Uni.PORTUGAL
P.O.Box 108
4801 Guimaraes
Portugal Electronics & Telecomunications Dept.

prvalko (prvalko@vela.acs.oakland.edu) wrote:
: The way I understand it, one uses the satellites such that the LOWER
: frequency never gets adjusted. i.e. on RS-10/11 you tune the 145
: transmitter so that the 29 MHz receive frequency stays put.

: Am I right or wrong on this?

: 73 paul wb8zjl (newbie)

461. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 23:43:52 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755826232@afit.af.mil>
Source record: 28221

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93345.46188666 .00005419 00000-0 52909-3 0 3860
2 20580 28.4709 1.6300 0005714 286.6621 72.1424 14.90379666 1344
STS 61
1 22917U 93075A 93346.91666667 .00000086 00000-0 95796-6 0 332
2 22917 28.4721 352.2809 0006031 290.1471 332.0933 14.90687234 1570
HST Array
1 22920U 90037C 93345.32182143 .00012724 00000-0 11609-2 0 101
2 22920 28.4713 2.4416 0005168 87.7195 272.3549 14.93670423 1334
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

462. Two-Line Orbital Element Set: Space Shuttle

Newsgroup: rec.radio.amateur.space
Date: 1993-12-13 23:44:08 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755826248@afit.af.mil>
Source record: 28224
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. As a service to the satellite user community, the most current elements for the current shuttle mission are provided below. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily), shuttle elements, and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

```
HST
1 20580U 90037B 93345.46188666 .00005419 00000-0 52909-3 0 3860
2 20580 28.4709 1.6300 0005714 286.6621 72.1424 14.90379666 1344
STS 61
1 22917U 93075A 93346.91666667 .00000086 00000-0 95796-6 0 332
2 22917 28.4721 352.2809 0006031 290.1471 332.0933 14.90687234 1570
HST Array
1 22920U 90037C 93345.32182143 .00012724 00000-0 11609-2 0 101
2 22920 28.4713 2.4416 0005168 87.7195 272.3549 14.93670423 1334
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

463. Re: Two-Line Element Set Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-14 01:02:46 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.755830966@afit.af.mil>
Source record: 28222

Dave <HARTRUM@delphi.com> writes:

>Your message on two-line element set questions was very informative. Where can
>one find more information about the SGP4 orbital model and algorithms for
>computing satellite positions based on this model?
>---------
>Dave Hartrum
>hartrum@delphi.com or 71664.1743@compuserve.com

>
The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

464. Mars Probe

Newsgroup: rec.radio.amateur.space
Date: 1993-12-14 02:40:25 UTC
From: psicop@pipeline.com
Message-ID: <2ej92p$gj7@pipeline.com>
Source record: 28223

For your information and files.

---

27 August 1993
For Immediate Release
From Uri Geller and Riley G

Psychics Probe Mars Mission
As NASA computers sent out electronic signals, NASA
managers were anxiously awaiting any response
from the silent Mars Observer Spaceship. Two (2) psychics were
busy doing their own mind probes from afar.
Psychic, Uri Geller of Berkshire, England and Psychic
Detective, Riley G of New York City were both
conducting remote viewings (mind probes) from their homes. Both
psychics did not like what they saw.
Uri and Riley both come to the conclusion that the Mars
Observer Spaceship is still intact. It seems they
found some sort of intervening jamming device that is impeding
with the spaceships ability to send and receive
its electronic data.
Using their psychic abilities, both Uri and Riley are
presently trying to locate the source of the jamming.
If requested, both psychics are willing to travel to NASA
Headquarters to help free the jammed spaceships' signals.
Uri Geller is a world renowned psychic that has helped
various government agencies around the world.
He is known for his abilities to bend metal with his mind, and
helping private companies locate precious metals
and oil.
Riley G was a New York City Police Officer who medically
retired in 1990 after suffering a severe neck
injury while with the NYPD. He now helps Police Agencies around
the world with his crime fighting psychic
abilities.
-30-

The Thin Blue Line,
Riley G
Psychic Detective
Retired NYPD (Disability)

Headin' down the highway, I'm Born to be Wild

465. Re: Nasa space link

Newsgroup: rec.radio.amateur.space
Date: 1993-12-14 15:12:05 UTC
From: Curtis_Eickerman-P11578@email.mot.com
Message-ID: <1993Dec14.151205.1239@schbbs.mot.com>
Source record: 28226

In article <CHzEqD.3FF@zimmer.CSUFresno.EDU>, normd@zimmer.CSUFresno.EDU (Norm Davis) says:
>
>It appears that the telnet number for the Space link has changed.(I
>can't get in.) could someone please give me the verbose address as I
>have lost it, or at least the new telnet number. Thanks Norm.
>
>norm_davis@zimmer.CSUFresno.edu
>
The telnet number for SpaceLink has not changed. I just logged in to be
sure. It did take several attempts so I suspect its been busy.
Address: spacelink.msfc.nasa.gov
192.149.89.61

Curtis Eickerman
WB6PUS

466. Re: Free Radio Bands Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-14 15:36:54 UTC
From: CSLE87@maccvm.corp.mot.com
Message-ID: <1993Dec14.154748.1915@schbbs.mot.com>
Source record: 28225

To carry this discussion one step further, the FCC has issued several public statements cautioning potential investors in these so-called "FCC goldmines" that they do not exist. Companies claiming that you can sell your winning lottery entry for gazillions of dollars did not apparently read the rules. Winners MUST CONSTRUCT the complete system before they can sell their license to a PCS system.
As Max pointed out, there are no available spectrum windows for any new alternative services, and the existing opportunities involve multi-BILLION dollar investments in newly developing technologies. I don't vote for the bank, try investing in stocks of the companies that will be building the hardware when PCS and other services get rolling. WA8NVW
------------------------ Original Article ------------------------
Newsgroups: rec.radio.amateur.space
From: roesler@c1mpls.mn.org (Max Roesler)
Subject: Re: Free Radio Bands Questions
Organization: Cellular One, Minneapolis
References: <CHrzHw.Bp9@murdoch.acc.Virginia.EDU>
Date: Mon, 13 Dec 1993 17:27:17 GMT
Lines: 33

mb7s@fermi.clas.Virginia.EDU (Mikhail Boukhny) writes:
: Someone has asked me recently what if he wants to build a competing network
: for cellular phones. Are there any gaps yet in the bandwidth? Whom should he
: ask to? Federal Communication Commission? Any information would be appreciated

No such luck, Mike. There are some upcoming initiatives before the FCC regarding spectrum expansion for wireless LAN networks, PCS, and digital messaging, etc., but nothing that's available for the public. Any new spectrum allocation will almost certainly br accompanied by a license lottery, for which the applicant must post significant bond as proof of his/her ability to build a system.

SMR, which was more akin to the older style 'mobile operator' phone system has undergone significant chages in the last few years, and is very cellular-like, although you don't really use cells, and roaming options are quite limited. SMR operators are employing these systems on the existing SMR spectrum.

PCS is also getting a lot of attention, but the existing cellular carriers are making great strides at providing these services given their existing equipment.

I would say your friend's cash is a lot safer in the bank than it is trying to create a new communications competitor. You're better off investing in one of the existing options- getting new spectrum for your own project would cost millions and require at least 5 years of paperwork.

(My thoughts, not my employer's, who obviously disagreed with me)
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****
* Max Roesler | roesler@loki.ncent.mccaw.com *
* EIS Project Manager | Minneapolis, MN; (612) 832-7653 *
* McCaw Communications | PP-ASEL (C172); N0RGH (EN34/35) *

467. Guide to the Personal Radio Newsgroups

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 12:00:59 UTC
From: pschleck@unomaha.edu
Message-ID: <radio/personal-intro-1-755956855@unomaha.edu>
Source record: 28227
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.antenna,rec.radio.amateur.digital.misc,rec.radio.amateur.equipment,rec.radio.amateur.homebrew,rec.radio.amateur.policy,rec.radio.amateur.space,rec.radio.cb,rec.radio.info,rec.answers,news.answers

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Posted-By: auto-faq 3.1.1.4
Archive-name: radio/personal-intro
Revision: 1.5 09/18/93 16:49:31
Changes: new mailing lists, .packet rmgroup, and .policy updates

(Note: The following is reprinted with the permission of the author.)

This message describes the rec.radio.amateur.*, rec.radio.cb, rec.radio.info,
and rec.radio.swap newsgroups. It is intended to serve as a guide for the new
reader on what to find where. Questions and comments may be directed to the
author, Jay Maynard, K5ZC, by Internet electronic mail at
jmaynard@oac.hsc.uth.tmc.edu. This message was last changed on 18 September
1993 to add the mailing lists for the new rec.radio.amateur newsgroups, to
note the rmgroup of rec.radio.amateur.packet, and to officially retire some
(in)famous threads of discussion on rec.radio.amateur.policy.

History
=======

Way back when, before there was a Usenet, the Internet hosted a mailing list
for hams, called (appropriately enough) INFO-HAMS. Ham radio discussions
were held on the mailing list, and sent to the mailboxes of those who had
signed up for it. When the Usenet software was created, and net news as we
now know it was developed, a newsgroup was created for hams: net.ham-radio.
The mailing list and the newsgroup were gatewayed together, eventually.

As the net grew, and as packet radio came into vogue, packet discussion began
to dominate other topics in the group and on the list. This resulted in the
logical solution: a group was created to hold the packet discussion, and
another corresponding mailing list was created as well: net.ham-radio.packet
and PACKET-RADIO, respectively.

These two groups served for several years, and went through Usenet's Great
Renaming essentially unchanged, moving from net.ham-radio[.packet] to
rec.ham-radio[.packet]. Readership and volume grew with the rest of the
network.

The INFO-HAMS mailing list was originally run from a US Army computer at
White Sands Missile Range, SIMTEL20. There were few problems with this
arrangement, but one was that the system was not supposed to be used for
commercial purposes. Since one of hams' favorite pastimes is swapping
gear, it was natural for hams to post messages about equipment for sale
to INFO-HAMS/rec.ham-radio. This ran afoul of SIMTEL20's no-commercial-use
restriction, and after some argument, a group was created specifically
```

for messages like that: rec.ham-radio.swap. This group wasn't gatewayed to a mailing list, thus avoiding problems.

While all this was happening, other folks wanted to discuss other aspects of the world of radio than the personal communications services. Those folks created the rec.radio.shortwave and rec.radio.noncomm newsgroups, and established the precedent of the rec.radio.* hierarchy, which in turn reflected Usenet's overall trend toward a hierarchical name structure.

The debate between proponents of a no-code ham radio license and its opponents grew fierce and voluminous in late 1989 and 1990. Eventually, both sides grew weary of the debate, and those who had not been involved even more so. A proposal for a newsgroup dedicated to licensing issues failed. A later proposal was made for a group that would cover the many recurring legal issues discussions. During discussion of the latter proposal, it became clear that it would be desirable to fit the ham radio groups under the rec.radio.* hierarchy. A full-blown reorganization was passed by Usenet voters in January 1991, leading to the overall structure we now use.

After the reorganization, more and more regular information postings began to appear, and were spread out across the various groups in rec.radio.*. Taking the successful example of the news.answers group, where informational postings from across the net are sent, the group rec.radio.info was created in December, 1992, with Mark Salyzyn, VE6MGS, initially serving as moderator.

In January, 1993, many users started complaining about the volume in rec.radio.amateur.misc. This led to a discussion about a second reorganization, which sparked the creation of a mailing list by Ian Kluft, KD6EUI. This list, which was eventually joined by many of the most prolific posters to the ham radio groups, came up with a proposal to add 11 groups to the rec.radio.amateur hierarchy in April 1993. The subsequent vote, held in May and early June, approved the creation of five groups: rec.radio.amateur.digital.misc (to replace .packet), .equipment, .homebrew, .antenna, and .space.

The Current Groups

I can hear you asking, "OK, so this is all neat history, but what does it have to do with me now?" The answer is that the history of each group has a direct bearing on what the group is used for, and what's considered appropriate where.

The easy one is rec.radio.amateur.misc. It is what rec.ham-radio was renamed to during the reorganization. Any message that's not more appropriate in one of the other groups belongs here, from contesting to DX to ragchewing on VHF to information on becoming a ham.

The group rec.radio.amateur.digital.misc is for discussions related to (surprise!) digital amateur radio. This doesn't have to be the common two-meter AX.25 variety of packet radio, either; some of the most knowledgeable folks in radio digital communications can be found here, and anything in the general area is welcome. The name was changed to emphasize

this, and to encourage discussion not only of other text-based digital modes, such as AMTOR, RTTY, and Clover, but things like digital voice and video as well. The former group, rec.radio.amateur.packet, should be removed by September 21st, 1993. It is obsolete, and you should use .digital.misc instead (or the appropriate new mailing list, mentioned below). The group has .misc as part of the name to allow further specialization if the users wish it, such as .digital.tcp-ip.

The swap group is now rec.radio.swap. This recognizes a fact that became evident shortly after the original group was formed: Hams don't just swap ham radio gear, and other folks besides hams swap ham equipment. If you have radio equipment, or test gear, or computer stuff that hams would be interested in, here's the place. Equipment wanted postings belong here too. Discussions about the equipment generally don't; if you wish to discuss a particular posting with the buyer, email is a much better way to do it, and the other groups, especially .equipment and .homebrew, are the place for public discussions. There is now a regular posting with information on how to go about buying and selling items in rec.radio.swap; please refer to it before you post there.

The first reorganization added two groups to the list, one of which is rec.radio.amateur.policy. This group was created as a place for all the discussions that seem to drag on interminably about the many rules, regulations, legalities, and policies that surround amateur radio, both existing and proposed. Recent changes to the Amateur Radio Rules (FCC Part 97) have finally laid to rest the Great Usenet Pizza Autopatch Debate as well as complaints about now-preempted local scanner laws hostile to amateurs, but plenty of discussion about what a bunch of rotten no-goodniks the local frequency coordinating body is, as well as the neverending no-code debate, may still be found here.

The other added group is rec.radio.cb. This is the place for all discussion about the Citizens' Band radio service. Such discussions have been very inflammatory in rec.ham-radio in the past; please do not cross-post to both rec.radio.cb and rec.radio.amateur.* unless the topic is genuinely of interest to both hams and CBers - and very few topics are.

The rec.radio.info group is just what its name implies: it's the place where informational messages from across rec.radio.* may be found, regardless of where else they're posted. As of this writing, information posted to the group includes Cary Oler's daily solar progagation bulletins, ARRL bulletins, the Frequently Asked Questions files for the various groups, and radio modification instructions. This group is moderated, so you cannot post to it directly; if you try, even if your message is crossposted to one of the other groups, your message will be mailed to the moderator, who is currently Mark Salyzyn, VE6MGS. The email address for submissions to the group is rec-radio-info@ve6mgs.ampr.ab.ca. Inquires and other administrivia should be directed to rec-radio-request@ve6mgs.ampr.ab.ca. For more information about rec.radio.info, consult the introduction and posting guidelines that are regularly posted to that newsgroup.

The groups rec.radio.amateur.antenna, .equipment, .homebrew, and .space are for more specialized areas of ham radio: discussions about antennas,

commercially-made equipment, homebrewing, and amateur radio space operations. The .equipment group is not the place for buying or selling equipment; that's what rec.radio.swap is for. Similarly, the .space group is specifically about amateur radio in space, such as the OSCAR program and SAREX, the Shuttle Amateur Radio EXperiment; other groups cover other aspects of satellites and space. Homebrewing isn't about making your own alcoholic beverages at home (that's rec.crafts.brewing), but rather construction of radio and electronic equipment by the amateur experimenter.

Except for rec.radio.swap and rec.radio.cb, all of these newsgroups are available by Internet electronic mail in digest format; send a mail message containing "help" on a line by itself to listserv@ucsd.edu for instructions on how to use the mail server.

All of the groups can be posted to by electronic mail, though, by using a gateway at the University of Texas at Austin. To post a message this way, change the name of the group you wish to post to by replacing all of the '.'s with '-'s - for example, rec.radio.swap becomes rec-radio-swap - and send to that name@cs.utexas.edu (rec-radio-swap@cs.utexas.edu, for example). You may crosspost by including multiple addresses as Cc: entries (but see below). This gateway's continued availability is at the pleasure of the admins at UT-Austin, and is subject to going away at any time - and especially if forgeries and other net.abuses become a problem. You have been warned.

A Few Words on Crossposting
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Please do not crosspost messages to two or more groups unless there is genuine interest in both groups in the topic being discussed, and when you do, please include a header line of the form "Followup-To: group.name" in your article's headers (before the first blank line). This will cause followups to your article to go to the group listed in the Followup-To: line. If you wish to have replies to go to you by email, rather than be posted, use the word "poster" instead of the name of a group. Such a line appears in the headers of this article.

One of the few examples of productive cross-posting is with the rec.radio.info newsgroup. To provide a filtered presentation of information articles, while still maintaining visibility in their home newsgroups, the moderator strongly encourages cross-posting. All information articles should be submitted to the rec.radio.info moderator so that he may simultaneously cross-post your information to the appropriate newsgroups. Most newsreaders will only present the article once, and network bandwidth is conserved since only one article is propagated. If you make regular informational postings, and have made arrangements with the moderator to post directly to the group, please cross-post as appropriate.

--
Jay Maynard, EMT-P, K5ZC, PP-ASEL | Never ascribe to malice that which can
jmaynard@oac.hsc.uth.tmc.edu | adequately be explained by stupidity.
"If my car ran OS/2, it'd be there by now" -- bumper sticker
GCS d++ p+ c++ l+ m+/- s/++ g++ w++ t+ r

--
73, Paul W. Schleck, KD3FU

pschleck@unomaha.edu

Celebrating 60 years of the Univ. of Maryland ARA - W3EAX (1933-1993)

468. ANS-345 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 12:20:08 UTC
From: marcbg@netcom.com
Message-ID: <$ans345.1993@ampr.org>
Source record: 28229
Cross-posted to: rec.radio.amateur.misc,rec.radio.info,sbay.hams,rec.radio.amateur.space

From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Subject: ANS-345 BULLETINS
Newsgroups: local.amsat
Date: Sun, 12 Dec 1993 17:19:59 -0700 (MST)

SB SAT @ AMSAT $ANS-345.01
AO-13 FACES LONG ECLIPSE PERIODS

HR AMSAT NEWS SERVICE BULLETIN 345.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.01

AO-13 Experiences Long Solar Eclipse Which Affect Transponder Operations
James Miller (G3RUH) of the AO-13 Command Team reports that because of the long duration of the solar eclipse periods that AO-13 is experiencing, they have been forced to severely curtail transponder operations. Some of the eclipse periods have been as long as 2 hours. Battery bus voltage has become so low that the net affect has been that there has been no battery charging from orbit to orbit. The safety threshold on the battery bus voltage is currently set 12.6 volts. When the bus voltage drops below 12.6 volts, the on-board computer shuts down the beacon and brings all the other subsystems on AO-13 to a "low-power" state. Currently, with the transponders and telemetry beacons turned-off, the total current consumption on AO-13 is around 1 ampere. In attempt to remedy this low battery voltage problem, the Command Team has made an spacecraft attitude re-adjustment to Bahn Longitude 245 degrees and a Bahn Latitude of -5 degrees. But under the current solar eclipse circumstances, even this has not been sufficient to solve the problem of low battery voltage. So it was necessary to take even further steps including turning off all transponder operations on AO-13 until between Friday December 10 and Monday December 13, 13-DEC-93 around 03:28 UTC. It is hoped that this will bring AO-13 through this difficult time period, however, there is no guarantee that the above actions will be enough. It should be noted that AO-13's batteries are now 5 years old and the Command Team feels that is may be necessary to take a close look at the battery charging software and presets to determine if they need to be adjusted for the age of the batteries.

It is requested that all AO-13 users keep a close "ear" to the telemetry beacons which can be heard on a downlink frequency 145.812 MHz or 2400.646 MHz for the latest information on the transponder schedule.

The Command Team is always interested in hearing from the user any "constructive feedback" about AO-13 transponder operations.

The AO-13 Command Team ccurrnetlu consists of the following:

Peter DB2OS @ DB0FAU
James G3RUH @ GB7DDX
Graham VK5AGR @ VK5WI

[The AMSAT News Service (ANS) would like to thank G3RUH for the information which went into this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-345.02
IO-26 SUFFERS OBC CRASH

HR AMSAT NEWS SERVICE BULLETIN 345.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.02

IK2OVV Explains the IO-26 On-Board-Computer (OBC) Crash

After 45 days of uninterrupted BBS service on IO-26, on 8-DEC-93 at approximately 11:30 UTC, ITAMSAT IO-26 suffered a crash during a pass over Europe. IO-26 is now in an undefined status, with its trasmitter on but no MBL telemetry; the Command Team will try to regain control of the satellite in the next passes over Europe. The cause of the crash is still unclear; the Command Team is investigating on some new software used to access the BBS services. In the past, some other MICROSATs crashes were due to bugs found in the user software. ITAMSAT Command Team, while recommending users not to uplink to the satellite at this time, would like to receive reports about IO-26, especially regarding the presence of just the HDLC flags on the downlink or some sort of telemetry, either MBL or PHT style. However, after examining the memory dumps taken from IO-26, Alberto Zagni (I2KBD) and Harold Price (NK6K) have decided to begin the uploading of the high-level software to restore IHT (ITAMSAT Housekeeping Task) capability. The cause of the crash is still unknown; I2KBD and NK6K are working on the memory dumps, but the crash destroyed part of the internal logs kept by the high-level software. Since the crash happened as one of the Ground Command Stations in Milan was uplinking to the satellite using a new ground software (which has not yet been fully tested), there is chance that this was the cause of the crash. The ITAMSAT Command Team has decided not to turn the BBS on after the reloading of the software; the Team will start some Whole Orbit Data (WOD) collection in order to fully optimize the energy budget onboard the satellite. This will enable IO-26 to have higher power settings on the downlink. It is estimated that the high-level software will be working by this soon; stay tuned on the downlink for any news!

The ITAMSAT Command Team would like to thank again Harold Price (NK6K) for the great help in debugging the memory dumps and the Eyesat Command Team for helping during the initial recovery.

ITAMSAT Command Team can be reached via Internet as i2kbd@amsat.org or ik2ovv@amsat.org, and on Compuserve HAMNET.

73 de Luca Bertagnolio IK2OVV
ITAMSAT Command Team

/EX
SB SAT @ AMSAT $ANS-345.03
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 345.03 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

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Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-345.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 345.04 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 11, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-345.04

Weekly OSCAR Status Reports: 11-DEC-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF

Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
[G3RUH/DB2OS/VK5AGR]

FO-20: The following is the FO-20 operating schedule:
Analog mode: 15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC
Digital mode: otherwise noted above. [JJ1WTK]

IO-26: ITAMSAT sufferred a system crash after 45 days of flawless operations. The command team is gathering data to try to determine the source of the problem. They state that the transmitter is on, but the BBS is not open.

AO-16: Operations are normal. [WH6I]

LO-19: Operations are normal. [WH6I]

KO-23: Functioning normally. There have been some questions regarding image files. When WH6I see some images on KITSAT, he trys to list them, but files on that satellite are only active for maybe 5-6 days depending on how much new material is uploaded. Therefore, by the time this status report makes it to the ANS status report, the files may be gone. Satellite image files on KITSAT have names in the form KAI?xxxx where ? is either W or N to indicate a WIDE or NARROW view image. The "xxxx" is a serial number. These files are about 350Kbytes large and can be seen in the directory in PB by hitting F4 to see the list of files generated by the satellite. They are usually in pairs with a wide and narrow view file. These files are downloaded just like anyother file. The program DISPLAY which is often up on the birds willdisplay these images, and it will display whatever there is in the xxxx.ACT file of the image, so that you can look at a partial download and decide if it is worth pursuing. [WH6I]

RS-10: After a period of inactivity, the RS-10 QSO robot is QRV again. The downlink is approx 29.403 MHz, and uplink is +/- 145.820 MHz. If you are "into" the robot receiver, your CW from the few KHz wide passband will be retransmitted on the robot's fixed frequency. The speed of your CW response is not important; it just needs to be steadily and cleanly sent. K0BJ notes that he just changed from a vertical dipole to a J-pole. It seems so far to be about as bad with QSB as the dipole, but the J-pole did seem to peak more in the longer, low-elevation parts of the pass. The next experiment K0BJ will perform is with a turnstile antenna.

POSAT: CT1ENQ would like to inform that the Portuguese satellite (POSAT) is now prepared for amateur radio use. Please contact Portuguese AMSAT group, AMSAT-PO, for more information.

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on

INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX
--
Marc Grant
marcbg@netcom.com

469. Re: New To Satellites

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 13:48:24 UTC
From: jms@col.hp.com
Message-ID: <2en4j8$bi9@hp-col.col.hp.com>
Source record: 28228

Matthew Warner (WARNERMA@VAX1.ELON.EDU) wrote:
: Hello everyone.

: Just a quick question. I'm have been tracking amateur satellites for about a
: year or so, listening to SAREX and the like with the shuttle, listening to
: beacons on other birds.

: I'm interested in doing a little QSO work with these birds, but I can't seem
: to locate a book or anything with all the frequencies and information on the
: basics. Can anyone suggest a file to FTP or book to get that would explain
: much of it to me?

: Thanks in advance...

: Matt Warner, kc4yls
: warnerma@vax1.elon.edu
The ARRL publishes a good book on satellite operation. Don't remember the
exact title, but you can find it listed in QST. Costs about $20.00, at
least the last one I bought did.

Mike, K0TER

470. Re: Mars Probe

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 17:48:34 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7841@gold.gvg.tek.com>
Source record: 28230

Well, August was a long time ago. Has any heard any more from these
two gentlemen?

Inquiring Minds Need To Know

Randy
WA2AGE

471. AEA DSP-2232 Software Update?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 18:44:39 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7842@gold.gvg.tek.com>
Source record: 28231

I heard that AEA is going to have a software update for the DSP-2232 that enables the up/down clicks for Doppler control. Wonder if there are any other changes?

Has anyone heard any details yet?

I wonder if this will be a free upgrade for us satellite users, as the original docs list this as a feature?

Randy
WA2AGE

randyh@gvgadg.gvg.tek.com
wa2age@amsat.org

472. Re: Mars Probe

Newsgroup: rec.radio.amateur.space
Date: 1993-12-15 19:28:38 UTC
From: prvalko@vela.acs.oakland.edu
Message-ID: <2enoh6$5s9@oak.oakland.edu>
Source record: 28232

Anytime I hear Uri Geller's name I recall the night he was on Johnie Carson's show with "The Amazing" Randi.

Randi and Carson (a respected magician in his own right) set up a bunch of items to "test" Geller's real abilities. Carson's crew made sure that Geller's henchmen had no access to the equipment prior to the program and Geller was humiliated, unable to do even the simplest of his so-called powers. He blamed his performance on nervousness, or the alignment of the planets or some other hogwash.

If psycics really want to be taken seriously, they would all band together and locate JUST ONE of those kids on the milk cartons.

473. InstantTrack 1.00B via FTP?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-16 16:50:19 UTC
From: roelle@sigi.JHUAPL.EDU
Message-ID: <9312161648.AA13104@sigi.jhuapl.edu>
Source record: 28233

The following paragraph discussing the "B" patch for the InstantTrac
program was found a the archive.afit.af.mil site. The patch is not in
the pub/space directory but is available via the Celestial BBS (TS Kelso,
SYSOP).

>[1] ITPATCH2.ZIP 9111 5-May-1992 01:53
> Patch #2 to InstantTrack 1.00. This program updates InstantTrac
> or 1.00a to version 1.00b. This patch is mandatory for anybody
> installed Patch #1, because it corrects a slightly dangerous bug
> Patch #1. Like Patch #1, this patch solves the problem of different
> NASA Keplerian elements file formats by permitting either format
> read in by InstantTrack.

Is there an ftp site with InstantTrac 1.00b version/patch?

Thank you.

Curt Roelle Curtis_Roelle@jhuapl.edu
Space Department / Space Sciences Branch
Johns Hopkins University -- Applied Physics Laboratory

474. Re: Nasa space link

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 12:58:33 UTC
From: burke_br@adcae1.comm.mot.com
Message-ID: <1993Dec17.125833.25276@lmpsbbs.comm.mot.com>
Source record: 28240

In article 3FF@zimmer.CSUFresno.EDU, normd@zimmer.CSUFresno.EDU (Norm Davis) writes:
}It appears that the telnet number for the Space link has changed.(I
}can't get in.) could someone please give me the verbose address as I
}have lost it, or at least the new telnet number. Thanks Norm.
}
}norm_davis@zimmer.CSUFresno.edu
}
}
}

It hasn't changed. I beleive they have reduced the number of available lines.
They have also started refusing connection in the event a port
isn't immediately available. It'll take some trying now, but you should be
able to get through.

Bruce, WB4YUC

475. ORBS$351.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 13:38:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-351.o.1993@ampr.org>
Source record: 28234
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-351.O
Orbital Elements 351.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX December 17, 1993
BID: $ORBS-351.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93329.34450477
Element set: 213
Inclination: 27.1217 deg
RA of node: 354.5434 deg
Eccentricity: 0.6014493
Arg of perigee: 132.9243 deg
Mean anomaly: 298.0909 deg
Mean motion: 2.06477387 rev/day
Decay rate: 9.0e-08 rev/day^2
Epoch rev: 7858
Checksum: 313

Satellite: UO-11
Catalog number: 14781
Epoch time: 93347.63778071
Element set: 618
Inclination: 97.7957 deg
RA of node: 5.9733 deg
Eccentricity: 0.0012132
Arg of perigee: 138.7307 deg
Mean anomaly: 221.4801 deg
Mean motion: 14.69101502 rev/day
Decay rate: 3.36e-06 rev/day^2
Epoch rev: 52306
Checksum: 297

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93346.85887632
Element set: 816
Inclination: 82.9251 deg
RA of node: 106.5708 deg
Eccentricity: 0.0011558
Arg of perigee: 175.5353 deg
```

Mean anomaly: 184.6087 deg
Mean motion: 13.72327864 rev/day
Decay rate: 5.2e-07 rev/day^2
Epoch rev: 32435
Checksum: 326

Satellite: AO-13
Catalog number: 19216
Epoch time: 93347.76722590
Element set: 825
Inclination: 57.9405 deg
RA of node: 279.0991 deg
Eccentricity: 0.7209579
Arg of perigee: 330.4319 deg
Mean anomaly: 3.4139 deg
Mean motion: 2.09722294 rev/day
Decay rate: -1.26e-06 rev/day^2
Epoch rev: 4212
Checksum: 317

Satellite: FO-20
Catalog number: 20480
Epoch time: 93348.51106707
Element set: 614
Inclination: 99.0150 deg
RA of node: 170.4022 deg
Eccentricity: 0.0541436
Arg of perigee: 37.9788 deg
Mean anomaly: 325.8201 deg
Mean motion: 12.83222705 rev/day
Decay rate: 1.0e-08 rev/day^2
Epoch rev: 18043
Checksum: 268

Satellite: AO-21
Catalog number: 21087
Epoch time: 93346.53792222
Element set: 375
Inclination: 82.9450 deg
RA of node: 280.8321 deg
Eccentricity: 0.0033923
Arg of perigee: 244.0125 deg
Mean anomaly: 115.7536 deg
Mean motion: 13.74529858 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 14394
Checksum: 308

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93348.49534730

Element set: 618
Inclination: 82.9194 deg
RA of node: 148.4132 deg
Eccentricity: 0.0028050
Arg of perigee: 263.3433 deg
Mean anomaly: 96.4670 deg
Mean motion: 13.74031986 rev/day
Decay rate: 7.3e-07 rev/day^2
Epoch rev: 14328
Checksum: 312

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

476. ORBS$351.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 13:40:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-351.d.1993@ampr.org>
Source record: 28235
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-351.D
Orbital Elements 351.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX December 17, 1993
BID: $ORBS-351.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93349.67199115
Element set: 918
Inclination: 98.6030 deg
RA of node: 71.8539 deg
Eccentricity: 0.0011561
Arg of perigee: 14.3284 deg
Mean anomaly: 345.8240 deg
Mean motion: 14.29810426 rev/day
Decay rate: 8.7e-07 rev/day^2
Epoch rev: 20336
Checksum: 304

Satellite: AO-16
Catalog number: 20439
Epoch time: 93348.68500703
Element set: 718
Inclination: 98.6114 deg
RA of node: 71.9264 deg
Eccentricity: 0.0011935
Arg of perigee: 17.1705 deg
Mean anomaly: 342.9896 deg
Mean motion: 14.29866727 rev/day
Decay rate: 7.1e-07 rev/day^2
Epoch rev: 20323
Checksum: 317

Satellite: DO-17
Catalog number: 20440
Epoch time: 93349.21698811
Element set: 718
Inclination: 98.6116 deg
RA of node: 72.7157 deg
Eccentricity: 0.0011956
Arg of perigee: 15.9664 deg
```

Mean anomaly: 344.1900 deg
Mean motion: 14.30004552 rev/day
Decay rate: 8.5e-07 rev/day^2
Epoch rev: 20332
Checksum: 290

Satellite: WO-18
Catalog number: 20441
Epoch time: 93348.69937128
Element set: 719
Inclination: 98.6116 deg
RA of node: 72.2175 deg
Eccentricity: 0.0012540
Arg of perigee: 16.4110 deg
Mean anomaly: 343.7492 deg
Mean motion: 14.29981529 rev/day
Decay rate: 6.2e-07 rev/day^2
Epoch rev: 20325
Checksum: 302

Satellite: LO-19
Catalog number: 20442
Epoch time: 93349.24947759
Element set: 718
Inclination: 98.6118 deg
RA of node: 72.9752 deg
Eccentricity: 0.0012907
Arg of perigee: 14.3827 deg
Mean anomaly: 345.7680 deg
Mean motion: 14.30074224 rev/day
Decay rate: 5.5e-07 rev/day^2
Epoch rev: 20333
Checksum: 314

Satellite: UO-22
Catalog number: 21575
Epoch time: 93347.69917846
Element set: 418
Inclination: 98.4537 deg
RA of node: 60.7730 deg
Eccentricity: 0.0008351
Arg of perigee: 118.5223 deg
Mean anomaly: 241.6789 deg
Mean motion: 14.36873420 rev/day
Decay rate: 1.29e-06 rev/day^2
Epoch rev: 12644
Checksum: 325

Satellite: KO-23
Catalog number: 22077
Epoch time: 93345.39316701

Element set: 314
Inclination: 66.0888 deg
RA of node: 313.1719 deg
Eccentricity: 0.0006629
Arg of perigee: 333.7426 deg
Mean anomaly: 26.3244 deg
Mean motion: 12.86282118 rev/day
Decay rate: .00000000 rev/day^2
Epoch rev: 6263
Checksum: 277

Satellite: AO-27
Catalog number: 22825
Epoch time: 93340.63744409
Element set: 215
Inclination: 98.6748 deg
RA of node: 53.2005 deg
Eccentricity: 0.0009518
Arg of perigee: 54.0663 deg
Mean anomaly: 306.1406 deg
Mean motion: 14.27594182 rev/day
Decay rate: 1.02e-06 rev/day^2
Epoch rev: 1021
Checksum: 276

Satellite: IO-26
Catalog number: 22826
Epoch time: 93340.21182841
Element set: 216
Inclination: 98.6747 deg
RA of node: 52.7873 deg
Eccentricity: 0.0010063
Arg of perigee: 55.9732 deg
Mean anomaly: 304.2402 deg
Mean motion: 14.27696330 rev/day
Decay rate: 8.9e-07 rev/day^2
Epoch rev: 1015
Checksum: 288

Satellite: KO-25
Catalog number: 22830
Epoch time: 93343.69918726
Element set: 217
Inclination: 98.5771 deg
RA of node: 55.5101 deg
Eccentricity: 0.0011977
Arg of perigee: 14.6554 deg
Mean anomaly: 345.4937 deg
Mean motion: 14.28021359 rev/day
Decay rate: 1.14e-06 rev/day^2
Epoch rev: 1065

```
Checksum: 304

/EX
```

477. ORBS$351.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 13:44:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-351.w.1993@ampr.org>
Source record: 28236
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-351.W
Orbital Elements 351.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX December 17, 1993
BID: $ORBS-351.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93342.70049786
Element set: 616
Inclination: 99.0787 deg
RA of node: 25.7011 deg
Eccentricity: 0.0015669
Arg of perigee: 39.5125 deg
Mean anomaly: 320.7148 deg
Mean motion: 14.13568935 rev/day
Decay rate: 1.40e-06 rev/day^2
Epoch rev: 46343
Checksum: 316

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93348.68493674
Element set: 515
Inclination: 98.5126 deg
RA of node: 358.3040 deg
Eccentricity: 0.0013631
Arg of perigee: 144.1093 deg
Mean anomaly: 216.1007 deg
Mean motion: 14.24850683 rev/day
Decay rate: 1.15e-06 rev/day^2
Epoch rev: 37633
Checksum: 304

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93349.70345839
Element set: 217
Inclination: 82.5455 deg
RA of node: 54.5487 deg
Eccentricity: 0.0016373
Arg of perigee: 341.3246 deg
```

Mean anomaly: 18.7334 deg
Mean motion: 13.84701640 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 29696
Checksum: 325

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93346.80315956
Element set: 217
Inclination: 82.5436 deg
RA of node: 95.5811 deg
Eccentricity: 0.0017397
Arg of perigee: 13.4176 deg
Mean anomaly: 346.7420 deg
Mean motion: 13.16962105 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 25872
Checksum: 307

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93343.64835682
Element set: 414
Inclination: 99.1541 deg
RA of node: 323.1130 deg
Eccentricity: 0.0011352
Arg of perigee: 309.4166 deg
Mean anomaly: 50.6021 deg
Mean motion: 14.12938766 rev/day
Decay rate: 1.08e-06 rev/day^2
Epoch rev: 26845
Checksum: 282

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93347.32765656
Element set: 217
Inclination: 82.5189 deg
RA of node: 292.0914 deg
Eccentricity: 0.0015591
Arg of perigee: 31.7134 deg
Mean anomaly: 328.4975 deg
Mean motion: 13.84351562 rev/day
Decay rate: 7.3e-07 rev/day^2
Epoch rev: 24197
Checksum: 331

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93349.30258631

Element set: 924
Inclination: 82.5570 deg
RA of node: 37.1296 deg
Eccentricity: 0.0010491
Arg of perigee: 27.8414 deg
Mean anomaly: 332.3188 deg
Mean motion: 13.09350075 rev/day
Decay rate: 3.9e-07 rev/day^2
Epoch rev: 19892
Checksum: 296

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93340.51939313
Element set: 716
Inclination: 82.5454 deg
RA of node: 1.5084 deg
Eccentricity: 0.0015399
Arg of perigee: 333.1603 deg
Mean anomaly: 26.8773 deg
Mean motion: 13.84183900 rev/day
Decay rate: 1.5e-07 rev/day^2
Epoch rev: 17396
Checksum: 299

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93353.47337400
Element set: 826
Inclination: 98.8532 deg
RA of node: 14.2782 deg
Eccentricity: 0.0015572
Arg of perigee: 148.2947 deg
Mean anomaly: 217.4563 deg
Mean motion: 14.01401993 rev/day
Decay rate: 5.13e-06 rev/day^2
Epoch rev: 16853
Checksum: 311

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93349.33459309
Element set: 717
Inclination: 82.5249 deg
RA of node: 292.2530 deg
Eccentricity: 0.0012249
Arg of perigee: 199.1685 deg
Mean anomaly: 160.9002 deg
Mean motion: 13.83566595 rev/day
Decay rate: 4.9e-07 rev/day^2
Epoch rev: 16233

Checksum: 319

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93338.45465636
Element set: 621
Inclination: 82.5407 deg
RA of node: 307.2624 deg
Eccentricity: 0.0012656
Arg of perigee: 318.6913 deg
Mean anomaly: 41.3690 deg
Mean motion: 13.16460415 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 12573
Checksum: 282

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93343.68590379
Element set: 821
Inclination: 98.6398 deg
RA of node: 10.4630 deg
Eccentricity: 0.0013990
Arg of perigee: 67.1544 deg
Mean anomaly: 293.1121 deg
Mean motion: 14.22342930 rev/day
Decay rate: 1.96e-06 rev/day^2
Epoch rev: 13359
Checksum: 299

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93346.67795598
Element set: 620
Inclination: 82.5585 deg
RA of node: 248.4511 deg
Eccentricity: 0.0013414
Arg of perigee: 309.3762 deg
Mean anomaly: 50.6337 deg
Mean motion: 13.16825830 rev/day
Decay rate: 4.3e-07 rev/day^2
Epoch rev: 11191
Checksum: 309

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93348.52059674
Element set: 217
Inclination: 82.5480 deg
RA of node: 352.7765 deg
Eccentricity: 0.0023371

```
Arg of perigee: 26.7908 deg
Mean anomaly: 333.4566 deg
Mean motion: 13.82994283 rev/day
Decay rate: 5.5e-07 rev/day^2
Epoch rev: 1456
Checksum: 327

/EX
```

478. ORBS$351.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 13:46:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-351.m.1993@ampr.org>
Source record: 28237
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-351.M
Orbital Elements 351.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX December 17, 1993
BID: $ORBS-351.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93349.52245668
Element set: 30
Inclination: 51.6186 deg
RA of node: 28.4721 deg
Eccentricity: 0.0005889
Arg of perigee: 93.5243 deg
Mean anomaly: 266.6245 deg
Mean motion: 15.59059652 rev/day
Decay rate: 6.735e-05 rev/day^2
Epoch rev: 44738
Checksum: 331

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93347.93985058
Element set: 387
Inclination: 28.4711 deg
RA of node: 345.7216 deg
Eccentricity: 0.0005790
Arg of perigee: 312.5225 deg
Mean anomaly: 47.3535 deg
Mean motion: 14.90379146 rev/day
Decay rate: 7.14e-06 rev/day^2
Epoch rev: 172
Checksum: 300

Satellite: GRO
Catalog number: 21225
Epoch time: 93348.63568260
Element set: 7
Inclination: 28.4628 deg
RA of node: 72.2835 deg
Eccentricity: 0.0031872
Arg of perigee: 6.7684 deg
```

Mean anomaly: 353.3175 deg
Mean motion: 15.46850505 rev/day
Decay rate: 5.854e-05 rev/day^2
Epoch rev: 2844
Checksum: 305

Satellite: UARS
Catalog number: 21701
Epoch time: 93347.79704880
Element set: 419
Inclination: 56.9823 deg
RA of node: 181.8981 deg
Eccentricity: 0.0005886
Arg of perigee: 101.3706 deg
Mean anomaly: 258.6133 deg
Mean motion: 14.96277614 rev/day
Decay rate: 2.750e-05 rev/day^2
Epoch rev: 12317
Checksum: 319

Satellite: POSAT
Catalog number: 22829
Epoch time: 93347.13414048
Element set: 209
Inclination: 98.6664 deg
RA of node: 59.6556 deg
Eccentricity: 0.0010662
Arg of perigee: 24.2746 deg
Mean anomaly: 335.9074 deg
Mean motion: 14.27989961 rev/day
Decay rate: 1.07e-06 rev/day^2
Epoch rev: 1114
Checksum: 311

/EX

479. ORBS$351.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 13:48:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-351.n.1993@ampr.org>
Source record: 28238
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-351.N
2Line Orbital Elements 351.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX December 17, 1993
BID: $ORBS-351.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 78587
UO-11
1 14781U 84021B 93347.63778071 .00000336 00000-0 61040-4 0 6186
2 14781 97.7957 5.9733 0012132 138.7307 221.4801 14.69101502523065
RS-10/11
1 18129U 87054A 93346.85887632 .00000052 00000-0 50838-4 0 8160
2 18129 82.9251 106.5708 0011558 175.5353 184.6087 13.72327864324350
AO-13
1 19216U 88051B 93347.76722590 -.00000126 00000-0 10000-4 0 8258
2 19216 57.9405 279.0991 7209579 330.4319 3.4139 2.09722294 42126
FO-20
1 20480U 90013C 93348.51106707 .00000001 00000-0 29498-4 0 6142
2 20480 99.0150 170.4022 0541436 37.9788 325.8201 12.83222705180430
AO-21
1 21087U 91006A 93346.53792222 .00000085 00000-0 82657-4 0 3754
2 21087 82.9450 280.8321 0033923 244.0125 115.7536 13.74529858143941
RS-12/13
1 21089U 91007A 93348.49534730 .00000073 00000-0 71177-4 0 6184
2 21089 82.9194 148.4132 0028050 263.3433 96.4670 13.74031986143289
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
UO-14
1 20437U 90005B 93349.67199115 .00000087 00000-0 41549-4 0 9180
2 20437 98.6030 71.8539 0011561 14.3284 345.8240 14.29810426203360
AO-16
1 20439U 90005D 93348.68500703 .00000071 00000-0 35203-4 0 7182
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2 20439 98.6114 71.9264 0011935 17.1705 342.9896 14.29866727203231
DO-17
1 20440U 90005E 93349.21698811 .00000085 00000-0 40830-4 0 7189
2 20440 98.6116 72.7157 0011956 15.9664 344.1900 14.30004552203320
WO-18
1 20441U 90005F 93348.69937128 .00000062 00000-0 31887-4 0 7196
2 20441 98.6116 72.2175 0012540 16.4110 343.7492 14.29981529203257
LO-19
1 20442U 90005G 93349.24947759 .00000055 00000-0 29135-4 0 7184
2 20442 98.6118 72.9752 0012907 14.3827 345.7680 14.30074224203334
UO-22
1 21575U 91050B 93347.69917846 .00000129 00000-0 50647-4 0 4185
2 21575 98.4537 60.7730 0008351 118.5223 241.6789 14.36873420126442
KO-23
1 22077U 92052B 93345.39316701 .00000000 00000-0 10000-3 0 3145
2 22077 66.0888 313.1719 0006629 333.7426 26.3244 12.86282118 62639
AO-27
1 22825U 93061C 93340.63744409 .00000102 00000-0 49453-4 0 2157
2 22825 98.6748 53.2005 0009518 54.0663 306.1406 14.27594182 10212
IO-26
1 22826U 93061D 93340.21182841 .00000089 00000-0 43990-4 0 2163
2 22826 98.6747 52.7873 0010063 55.9732 304.2402 14.27696330 10159
KO-25
1 22830U 93061H 93343.69918726 .00000114 00000-0 53800-4 0 2173
2 22830 98.5771 55.5101 0011977 14.6554 345.4937 14.28021359 10653
NOAA-9
1 15427U 84123A 93342.70049786 .00000140 00000-0 84766-4 0 6165
2 15427 99.0787 25.7011 0015669 39.5125 320.7148 14.13568935463439
NOAA-10
1 16969U 86073A 93348.68493674 .00000115 00000-0 57386-4 0 5153
2 16969 98.5126 358.3040 0013631 144.1093 216.1007 14.24850683376333
MET-2/17
1 18820U 88005A 93349.70345839 .00000047 00000-0 36174-4 0 2176
2 18820 82.5455 54.5487 0016373 341.3246 18.7334 13.84701640296968
MET-3/2
1 19336U 88064A 93346.80315956 .00000043 00000-0 10000-3 0 2174
2 19336 82.5436 95.5811 0017397 13.4176 346.7420 13.16962105258724
NOAA-11
1 19531U 88089A 93343.64835682 .00000108 00000-0 68580-4 0 4148
2 19531 99.1541 323.1130 0011352 309.4166 50.6021 14.12938766268450
MET-2/18
1 19851U 89018A 93347.32765656 .00000073 00000-0 60176-4 0 2173
2 19851 82.5189 292.0914 0015591 31.7134 328.4975 13.84351562241975
MET-3/3
1 20305U 89086A 93349.30258631 .00000039 00000-0 10000-3 0 9241
2 20305 82.5570 37.1296 0010491 27.8414 332.3188 13.09350075198928
MET-2/19
1 20670U 90057A 93340.51939313 .00000015 00000-0 79036-5 0 7162
2 20670 82.5454 1.5084 0015399 333.1603 26.8773 13.84183900173965
FY-1/2
```

```
1 20788U 90081A 93353.47337400 .00000513 00000-0 36251-3 0 8262
2 20788 98.8532 14.2782 0015572 148.2947 217.4563 14.01401993168534
MET-2/20
1 20826U 90086A 93349.33459309 .00000049 00000-0 39351-4 0 7171
2 20826 82.5249 292.2530 0012249 199.1685 160.9002 13.83566595162334
MET-3/4
1 21232U 91030A 93338.45465636 .00000043 00000-0 10000-3 0 6211
2 21232 82.5407 307.2624 0012656 318.6913 41.3690 13.16460415125735
NOAA-12
1 21263U 91032A 93343.68590379 .00000196 00000-0 96500-4 0 8212
2 21263 98.6398 10.4630 0013990 67.1544 293.1121 14.22342930133592
MET-3/5
1 21655U 91056A 93346.67795598 .00000043 00000-0 10000-3 0 6203
2 21655 82.5585 248.4511 0013414 309.3762 50.6337 13.16825830111916
MET-2/21
1 22782U 93055A 93348.52059674 .00000055 00000-0 45108-4 0 2173
2 22782 82.5480 352.7765 0023371 26.7908 333.4566 13.82994283 14568
MIR
1 16609U 86017A 93349.52245668 .00006735 00000-0 87706-4 0 309
2 16609 51.6186 28.4721 0005889 93.5243 266.6245 15.59059652447385
HUBBLE
1 20580U 90037B 93347.93985058 .00000714 00000-0 64125-4 0 3872
2 20580 28.4711 345.7216 0005790 312.5225 47.3535 14.90379146 1720
GRO
1 21225U 91027B 93348.63568260 .00005854 00000-0 10489-3 0 71
2 21225 28.4628 72.2835 0031872 6.7684 353.3175 15.46850505 28447
UARS
1 21701U 91063B 93347.79704880 .00002750 00000-0 26250-3 0 4198
2 21701 56.9823 181.8981 0005886 101.3706 258.6133 14.96277614123176
POSAT
1 22829U 93061G 93347.13414048 .00000107 00000-0 51149-4 0 2099
2 22829 98.6664 59.6556 0010662 24.2746 335.9074 14.27989961 11144
/EX
```

480. * SpaceNews 20-Dec-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 17:30:56 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1220.1993@ampr.org>
Source record: 28239
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1220
* SpaceNews 20-Dec-93 *

BID: $SPC1220

=========
SpaceNews
=========

MONDAY DECEMBER 20, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* ITAMSAT-OSCAR-26 NEWS *
========================
After examining the memory dumps taken from IO-26, Alberto Zagni I2KBD and Harold Price NK6K have decided to begin the uploading of the high-level software to restore IHT (Itamsat Housekeeping Task) capability.

The cause of the crash is still unknown. I2KBD and NK6K are working on the memory dumps, but the crash destroyed part of the internal logs kept by the high-level software. Since the crash happened as one of the Command Stations in Milan was uplinking to the satellite using a new ground software (which has not yet been fully tested), there is chance that this was the cause of the crash.

The ITAMSAT Command Team has decided not to turn the BBS on after the reloading of the software. The Team will start some WOD data collection in order to fully optimize the energy budget onboard the satellite. This will enable IO-26 to have higher power settings on the downlink. Stay tuned on the downlink for any late news!

The ITAMSAT Command Team would like to thank again Harold Price NK6K for the great help in debugging the memory dumps and the Eyesat Command Team for helping during the initial recovery.

ITAMSAT Command Team can be reached via Internet as i2kbd@amsat.org or ik2ovv@amsat.org, and on Compuserve HAMNET.

73 de Luca Bertagnolio IK2OVV
ITAMSAT Command Team

* AO-21 NEWS *
==============
After corresponding with Peter, DB2OS, Rick, VE4AMU reports that picture transmissions may be coming to OSCAR-21 soon. These transmissions will

be WEFAX compatible, so equipment currently used by ground stations to copy Meteosat and NOAA satellites will work with AO-21 transmissions. Image uploads to the satellite will be through control stations and will use JPEG compression.

[Info via VE4AMU]

* OSCAR SKN '94 *
==========
YOU'RE INVITED TO THE 22ND ANNUAL "STRAIGHT KEY NIGHT ON OSCAR"

As you know, ARRL has for many years sponsored Straight Key Night on New Year's Eve and New Year's Day; it is expected to do so again in 1994.

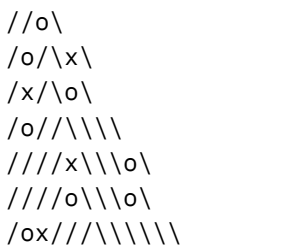
On New Year's Eve, 1972 (January 1, 1973 UTC), a few of us on the AMSAT 75-meter net decided that we would try to combine the best of the old and the new in Amateur Radio by operating in Straight Key Night on what was then the brand-new communications satellite, AMSAT-OSCAR 6. Since then, proud brasspounders have kept the tradition going by operating CW on OSCAR using straight keys for at least a little while on every New Year's Day (UTC) when there's been an OSCAR to work.

You're most cordially invited to join in the 22nd annual celebration. It's entirely informal and unofficial; there are no rules, no scoring and no need to send in a log. Just call CQ SKN in the CW passband segment of any OSCAR satellite between 0000 and 2359 UTC on January 1, 1994, or answer a CQ SKN call from another station. This year, we're changing things a little: we'll also count QSOs made via the oldest, largest and most reliable communications satellite, OSCAR Zero, otherwise known as the moon. AMSAT didn't build it, but we can adopt it! Of course, all SKN operating must be done with a straight hand key.

Just as in the ARRL HF version of this event, we're conducting a search for the OSCAR SKN operator with the best fist. Please send in a nomination of someone you worked; we'll announce the winner or winners via packet bulletin. Last year's winners were KB6A, W6HDO and W8JAQ. Nominations may be sent To Ray Soifer via packet to W2RS @ WA2SNA.NJ.USA.NA, from Europe to W2RS @ GB7HSN.#32.GBR.EU, via Internet to w2rs@amsat.org, or by mail via his Callbook address.

[Info via Ray, W2RS]

* SEASONS GREETINGS *
==========



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///o///\o\x\\\
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de John, KD2BD

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews,
especially:

KZ1Z N3QQB VE4AMU Robert Lyda

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any
of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center
Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

481. Weather Satellite Radio Report 2/1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 18:56:00 UTC
From: leo.wikholm@compart.fi
Message-ID: <1f.62.1818.0NC5ADBA@compart.fi>
Source record: 28242

```
************************************
WEATHER SATELLITE RADIO REPORT 2/1993
************************************

December 17, 1993
Station: Helsinki (+60N +25.1E)
Finnish Weather Satellite Group

Status of polar-orbiting weather satellites:

satellite frequency status
=====================================================================
NOAA 9 137,620 MHz normal
NOAA 10 137,500 MHz APT and BNC is off due to VHF-conflict
with NOAA 12
NOAA 11 137,620 MHz normal
NOAA 12 137,500 MHz normal
METEOR 2-21 137,400 MHz active. no images at higher latitudes
METEOR 3-3 137,300 MHz occasional
METEOR 3-5 137,300 MHz active. sends 20 lpm low-resolution IR
images above dark areas. no images at
higher latitudes (+60N)
=====================================================================

* Special thanks to Peter Henne for comments to the report! *

Please send your observations or comments to:

Leo Wikholm
internet: leo.wikholm@compart.fi
FidoNet : 2:220/861
```

482. Some RS Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 20:55:49 UTC
From: itrefz1@cc.swarthmore.edu
Message-ID: <itrefz1-171293154454@mac02.trotter1.swarthmore.edu>
Source record: 28241

I am new to the world of satellite operating, but have a two meter all-moder, a tracking program and an HF rig. I would like to work RS-10/11, but am confused on a few of the finer points.

Does RS-10 have a reverse linear transponder or a regular one? I'm not sure where between 29.360 and 29.400 to find my signal when uplinking on 2m.

How do I know which mode RS-10 is using? Does it only use one mode at a time, or all modes simulatneously? Which mode does it use the most? Do RS-10 and 11 use the same mode at the same time? I am interested in modes T and A.

Should I be able to hit RS-10 with 25 watts and a 5/8 vertical (at a very high location) consistantly if its high above the horizon? Would changing the orientation of the antenna from vertical to horizontal help?

How come I can't track RS-12/13 using Traksat and current TLE data?

Please post answers to any or all of these questions on the board or email me directly. Thank you.

Isaac Trefz (NJ3C)
itrefz1@cc.swarthmore.edu
(215) 690-5648

483. Two-Line Orbital Element Sets (TLE313)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-17 22:30:37 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.756167437@afit.af.mil>
Source record: 28243
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #313 -
Alouette 1
1 00424U 62049 93347.84296618 .00000074 00000-0 83162-4 0 9198
2 00424 80.4637 107.8695 0022752 230.4091 129.5065 13.67790887557060
ATS 3
1 03029U 67111A 93346.50794751 -.00000078 00000-0 10000-3 0 1142
2 03029 14.5196 9.3746 0012238 259.4557 249.8866 1.00273066 95567
Cosmos 398
1 04966U 71016A 93351.20396931 .00101700 61670-5 24037-3 0 8503
2 04966 51.4655 302.8047 1202855 200.9639 153.7811 13.46819246747850
Starlette
1 07646U 75010A 93344.66244918 -.00000050 00000-0 91590-5 0 7150
2 07646 49.8200 177.2969 0206091 73.6417 288.6989 13.82184866951760
LAGEOS
1 08820U 76039A 93349.58051051 .00000002 00000-0 10000-3 0 9206
2 08820 109.8542 72.7053 0044082 324.2939 35.4883 6.38664548155421
ETS-2
1 09852U 77014A 93348.29081642 -.00000090 00000-0 10000-3 0 9109
2 09852 11.8209 43.7338 0001406 88.5576 223.9071 1.00024368 8809
GOES 2
1 10061U 77048A 93350.61356813 .00000071 00000-0 10000-3 0 2307
2 10061 10.8533 47.9584 0002651 15.8781 106.3830 1.00277659 5284
IUE
1 10637U 78012A 93349.24630523 -.00000204 00000-0 10000-3 0 9225
2 10637 34.3232 97.8846 1306160 30.3631 353.9218 1.00263323 10889
GPS BI-01
1 10684U 78020A 93331.28584705 -.00000018 00000-0 10000-3 0 2092
2 10684 64.5359 51.5287 0064487 161.9483 198.3465 1.98079803100925
GPS BI-02
1 10893U 78047A 93346.27511031 -.00000022 00000-0 10000-3 0 48
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2 10893 63.6085 290.4497 0215658 13.6969 346.8575 2.01627249114307
GOES 3
1 10953U 78062A 93350.66706681 .00000067 00000-0 10000-3 0 2227
2 10953 9.7770 50.7101 0005374 127.2471 333.2202 1.00256890 9899
SeaSat 1
1 10967U 78064A 93348.83425429 .00000107 00000-0 56313-4 0 2186
2 10967 108.0006 80.6939 0002774 249.5380 110.5429 14.37900913809866
GPS BI-03
1 11054U 78093A 93345.13886341 -.00000022 00000-0 10000-3 0 1155
2 11054 63.3831 287.2810 0043571 176.3727 183.6362 1.93505862110873
Nimbus 7
1 11080U 78098A 93349.21719985 .00000019 00000-0 32716-4 0 3225
2 11080 99.0740 234.4526 0008313 268.2476 91.7720 13.83725931764631
GPS BI-04
1 11141U 78112A 93343.62010429 -.00000018 00000-0 00000+0 0 8159
2 11141 64.5587 52.0889 0042246 27.4346 332.8932 1.92892432 124
GPS BI-05
1 11690U 80011A 93336.45641137 -.00000013 00000-0 10000-3 0 7135
2 11690 64.8829 53.2166 0142106 198.1617 161.3838 2.00552877115593
GPS BI-06
1 11783U 80032A 93350.64835071 -.00000047 00000-0 10000-3 0 9151
2 11783 62.7755 284.3594 0205678 29.2455 331.8906 2.03456508100244
GOES 5
1 12472U 81049A 93350.58137649 .00000096 00000-0 10000-3 0 7101
2 12472 6.4500 60.1423 0004134 7.4600 87.4401 1.00248254 3933
Cosmos 1383
1 13301U 82066A 93349.89452886 .00000002 00000-0 -47755-5 0 2199
2 13301 82.9342 84.1554 0026236 238.6286 121.2331 13.68047669572365
LandSat 4
1 13367U 82072A 93349.44069061 .00000156 00000-0 39651-4 0 3902
2 13367 98.2074 46.0408 0008181 101.2083 259.0029 14.57112263607290
IRAS
1 13777U 83004A 93346.56332524 -.00000150 00000-0 -91135-4 0 5239
2 13777 98.9724 176.3485 0012934 107.3859 252.8650 13.99191248225040
Cosmos 1447
1 13916U 83021A 93346.88690715 .00000074 00000-0 71687-4 0 3182
2 13916 82.9460 149.4845 0037642 186.6800 173.3894 13.74300136537746
TDRS 1
1 13969U 83026B 93345.67289079 .00000125 00000-0 10000-3 0 2264
2 13969 7.3312 53.1044 0000419 303.8352 154.7960 1.00276077 12174
GOES 6
1 14050U 83041A 93351.20806035 -.00000226 00000-0 10000-3 0 1202
2 14050 5.2343 63.0290 0002660 300.0234 75.9567 1.00237569 10963
OSCAR 10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 50611
LandSat 5
1 14780U 84021A 93349.47946892 .00000172 00000-0 43246-4 0 9883
2 14780 98.1914 47.6538 0005718 104.6838 255.5001 14.57121269520719
UoSat 2
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1 14781U 84021B 93347.63778071 .00000336 00000-0 61040-4 0 6186
2 14781 97.7957 5.9733 0012132 138.7307 221.4801 14.69101502523065
GPS BI-09
1 15039U 84059A 93350.74540098 -.00000050 00000-0 10000-3 0 1230
2 15039 63.8616 46.7637 0056297 218.1301 141.5351 2.00560566 69687
Cosmos 1574
1 15055U 84062A 93347.61522896 .00000029 00000-0 24380-4 0 5180
2 15055 82.9560 201.8876 0028434 15.7649 344.4391 13.73596890475154
GPS BI-10
1 15271U 84097A 93347.18478039 -.00000020 00000-0 10000-3 0 7243
2 15271 62.4668 284.3904 0141170 346.2547 13.3607 2.00575556 66710
Cosmos 1602
1 15331U 84105A 93339.83342901 .00000873 00000-0 10110-3 0 2164
2 15331 82.5357 258.7317 0021786 117.9398 242.4151 14.84207994495825
NOAA 9
1 15427U 84123A 93350.91120665 .00000098 00000-0 76516-4 0 6170
2 15427 99.0781 34.0315 0015520 16.7902 343.3780 14.13571215464595
GPS BI-11
1 16129U 85093A 93348.41869135 -.00000013 00000-0 10000-3 0 5207
2 16129 64.6066 48.8807 0131115 141.7679 219.2385 2.00563318 6443
Mir
1 16609U 86017A 93351.25309831 .00007289 00000-0 97866-4 0 331
2 16609 51.6188 19.7769 0005725 99.5487 260.6154 15.59089672447666
SPOT 1
1 16613U 86019A 93349.52168099 .00000114 00000-0 62356-4 0 5841
2 16613 98.7122 61.2721 0001012 70.2223 289.9078 14.20026976 90488
Cosmos 1766
1 16881U 86055A 93349.88095842 .00000615 00000-0 73488-4 0 1178
2 16881 82.5187 307.4209 0021081 108.3448 252.0017 14.83252241398281
EGP
1 16908U 86061A 93348.59704947 -.00000025 00000-0 10000-3 0 8178
2 16908 50.0122 291.9010 0011408 202.9169 157.1130 12.44408617333779
NOAA 10
1 16969U 86073A 93348.68493674 .00000115 00000-0 57386-4 0 5153
2 16969 98.5126 358.3040 0013631 144.1093 216.1007 14.24850683376333
MOS-1
1 17527U 87018A 93350.79279423 .00000124 00000-0 12493-3 0 9853
2 17527 99.0575 58.1241 0001200 74.7595 285.3697 13.94894847347517
GOES 7
1 17561U 87022A 93351.21979052 -.00000045 00000-0 10000-3 0 6266
2 17561 1.1532 77.8527 0002554 306.5304 28.1748 1.00268932 8141
Kvant-1
1 17845U 87030A 93351.12489391 .00004346 00000-0 60985-4 0 6649
2 17845 51.6188 20.4237 0005812 96.3453 263.7653 15.59087276447715
DMSP B5D2-3
1 18123U 87053A 93348.71227328 .00000106 00000-0 64112-4 0 1376
2 18123 98.7880 178.0986 0014364 350.2980 9.7917 14.15323734334917
RS-10/11
1 18129U 87054A 93351.23346948 .00000044 00000-0 31419-4 0 8174
2 18129 82.9254 103.3386 0011695 163.5240 196.6301 13.72327961324950
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Meteor 2-16
1 18312U 87068A 93349.53190887 .00000033 00000-0 24789-4 0 2187
2 18312 82.5560 357.5187 0010906 270.0966 89.8915 13.84016236319653
Meteor 2-17
1 18820U 88005A 93349.70345839 .00000047 00000-0 36174-4 0 2176
2 18820 82.5455 54.5487 0016373 341.3246 18.7334 13.84701640296968
DMSP B5D2-4
1 18822U 88006A 93344.54181523 .00000181 00000-0 88859-4 0 2417
2 18822 98.4625 202.0610 0006244 167.1533 192.9807 14.22906719303687
Glonass 34
1 19163U 88043A 93346.18537159 .00000007 00000-0 10000-3 0 8188
2 19163 64.9895 116.7264 0006865 155.1344 204.8626 2.13101769 42675
Glonass 36
1 19165U 88043C 93350.46440970 .00000024 00000-0 10000-3 0 2138
2 19165 65.0299 116.5821 0002400 52.1364 307.8035 2.13101255 43380
METEOSAT 3
1 19215U 88051A 93347.89794434 -.00000220 00000-0 10000-3 0 8217
2 19215 1.3243 73.7965 0004232 231.1002 26.0890 1.00258296 8040
AO-13
1 19216U 88051B 93347.76722590 -.00000126 00000-0 10000-4 0 8258
2 19216 57.9405 279.0991 7209579 330.4319 3.4139 2.09722294 10626
OKEAN 1
1 19274U 88056A 93349.56987676 .00000539 00000-0 66334-4 0 8174
2 19274 82.5163 47.4355 0018183 253.2416 106.6793 14.82037359293886
Meteor 3-2
1 19336U 88064A 93351.20954343 .00000051 00000-0 10000-3 0 2183
2 19336 82.5491 92.4705 0017128 0.9992 359.1135 13.16963001259304
Glonass 39
1 19503U 88085C 93346.26596435 -.00000014 00000-0 10000-3 0 1130
2 19503 65.7464 355.6230 0006382 176.6085 183.4257 2.13102105 40782
NOAA 11
1 19531U 88089A 93343.64835682 .00000108 00000-0 68580-4 0 4148
2 19531 99.1541 323.1130 0011352 309.4166 50.6021 14.12938766268450
TDRS 2
1 19548U 88091B 93348.06224918 -.00000252 00000-0 10000-3 0 8265
2 19548 0.6104 79.1329 0003120 171.8597 152.0291 1.00262657 6358
Glonass 40
1 19749U 89001A 93344.42879504 .00000011 00000-0 10000-3 0 3215
2 19749 64.9312 116.3656 0005282 255.6695 104.2797 2.13101209 38257
Glonass 41
1 19750U 89001B 93348.70890206 .00000004 00000-0 10000-3 0 2136
2 19750 64.9873 116.2673 0011755 173.3663 186.5296 2.13098336 38367
GPS BII-01
1 19802U 89013A 93349.25362917 .00000019 00000-0 10000-3 0 8212
2 19802 55.0768 147.0128 0034793 174.0420 185.9732 2.00569769 35355
Akebono
1 19822U 89016A 93349.60945790 .00016437 00000-0 10094-2 0 1465
2 19822 75.0900 285.7287 3839119 65.1414 329.7556 7.73339507 95048
Meteor 2-18
1 19851U 89018A 93347.32765656 .00000073 00000-0 60176-4 0 2173
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2 19851 82.5189 292.0914 0015591 31.7134 328.4975 13.84351562241975
MOP-1
1 19876U 89020B 93349.94979159 .00000021 00000-0 10000-3 0 7200
2 19876 0.1251 348.6350 0000992 328.1261 109.5737 1.00263022 5243
TDRS 3
1 19883U 89021B 93351.32863622 -.00000266 00000-0 00000+0 0 8243
2 19883 0.0628 130.1848 0001260 54.4289 338.6503 1.00269376 87640
GPS BII-02
1 20061U 89044A 93348.59807884 -.00000032 00000-0 10000-3 0 8236
2 20061 54.7330 323.9578 0124555 204.3568 155.0457 2.00565265 33093
Nadezhda 1
1 20103U 89050A 93350.71535309 .00000026 00000-0 10667-4 0 9207
2 20103 82.9588 62.3315 0039181 77.7724 282.7817 13.73829715223259
GPS BII-03
1 20185U 89064A 93349.43351952 .00000019 00000-0 10000-3 0 8266
2 20185 54.9076 147.6448 0005752 230.3969 129.5179 2.00549788 31678
GMS 4
1 20217U 89070A 93348.46870373 -.00000250 00000-0 10000-3 0 9308
2 20217 0.1335 76.7197 0000169 1.0153 314.3950 1.00273141 16246
GPS BII-04
1 20302U 89085A 93347.47075847 -.00000012 00000-0 10000-3 0 8251
2 20302 53.6870 264.4891 0006140 317.1189 42.8916 2.00562542 30439
Meteor 3-3
1 20305U 89086A 93349.30258631 .00000039 00000-0 10000-3 0 9241
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2 22923 23.2669 267.1755 7107926 168.7250 225.5235 2.24043016 86
1993072E
1 22925U 93072E 93348.86340691 .00001245 00000-0 10812-2 0 48
2 22925 47.3664 268.1728 7218784 7.0259 359.1602 2.32579490 227
1993072F
1 22926U 93072F 93348.81491834 .00003737 00000-0 12633-2 0 30
2 22926 47.3242 268.0949 7237397 7.1015 359.1439 2.33073417 10
1993077A
1 22927U 93077A 93350.70356175 .00020990 58592-6 12500-2 0 33
2 22927 23.8806 275.0988 7305902 179.8842 181.0442 2.28209693 28
1993077B
1 22928U 93077B 93350.27280570 -.00739813 63773-4 -32444-1 0 15
2 22928 23.9467 276.3079 7307791 178.6518 187.4571 2.28387620 23
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology
```

484. Mir QSL address needed*******

Newsgroup: rec.radio.amateur.space
Date: 1993-12-19 08:47:58 UTC
From: jeff@ve6mgs.ampr.ab.ca
Message-ID: <CI9xrz.HuI@ve6mgs.ampr.ab.ca>
Source record: 28244

Can anyone tell me what the QSL address for R0mir-1 is?
please help!

485. ANS-351 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-19 19:18:22 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-351.01.1993@ampr.org>
Source record: 28245
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-351.01
PHASE-3D STATUS REPORT!

HR AMSAT NEWS SERVICE BULLETIN 351.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-351.01

The Phase 3-D Project Shifts Into High Gear

Following a series of meetings both in the United States and Germany involving key members of the International Phase 3-D Project Development Team, work on construction of the new amateur satellite is moving forward at an accelerated pace.

On December 11th and 12th, Hanspeter Kulen, DK1YQ, along with Dr. Karl Meinzer, DJ4ZC, AMSAT-DL President and Phase 3-D Team Leader, hosted a key meeting of the project's international participants near Munich, Germany. AMSAT-NA's Vice President for Engineering, Dick Jansson, WD4FAB, and Dr. Tom Clark, W3IWI, AMSAT-NA's President Emeritus and a key member of the Phase 3-D GPS experiment group, were also in attendance. Both Dick and Tom report that all phases of the project are "on track" for the expected launch of Phase 3-D in 1996.

"Each country's team is performing their assigned tasks very well," said Jansson on Dec. 13th, soon after his return from Germany. Clark observed that, "we are really pulling together as an international group." He went on to note that, "thanks to the work of our European, South African and Japanese friends, it now looks like we'll have some superb cameras, some really 'hot' receivers and some very powerful transmitters on Phase 3-D when it's launched in 1996." Specifically, Dick mentioned that Mike Dorsett's (G6GEJ) effort's on the spacecraft's 2 Meter transmitter are right on schedule and that Mike's proposed construction approach has already met all the key design parameters.

During the Munich meeting, Jansson was presented with a token of appreciation by Dr. Karl Meinzer for his outstanding contributions to the project. Karl cited Dick's superb design work on the Phase 3-D structure and thermal control system as well as his tireless efforts in support of the overall international project.

Just prior to his meetings in Germany, Jansson met with both students and faculty members from AMSAT-NA's team at Weber State University in Ogden, Utah. Weber students are now in the process of building the flight model structure for Phase 3-D. Dick reports that this vitally important portion

of AMSAT-NA's role in the overall effort is "also on schedule for delivery of flight hardware next June."

Other major contributions by AMSAT-NA to the project in the coming year will include the purchase of the spacecraft's heat pipes, solar panels and flight batteries, as well as final construction of the spacecraft's GPS positioning experiment, antennas and propellant flow hardware. In addition, yet another group of some 15 dedicated volunteers have now been assembled in the Orlando, Florida area. These people are already in the process of both securing and preparing the spacecraft's final integration facility. This team will also assist other project team members with integration activities beginning in mid-1994.

Jansson concluded by saying, "there is still a lot of work left on all of our plates between now and 1996." He also had high praise for the many volunteers now working on the project. "The ongoing work of our volunteers is of high quality, and is much appreciated. Without their selfless efforts, the Phase 3-D project simply would not happen." Jansson said.

/EX
SB SAT @ AMSAT $ANS-351.02
KO-25 EARTH IMAGING INFORMATION

HR AMSAT NEWS SERVICE BULLETIN 351.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-351.02

K6OYY Passes Along Some Information About KITSAT-OSCAR-25 (KO-25)

K6OYY has received an informative message from Mr. Hyungshin Kim of SaTReC/KAIST in Korea. Mr. Kim reports that the KO-25 images are not currently on KO-23, but that they will be available on KO-25 when its BBS is opened up sometime next year.

Currently images on KO-23 have the designation KAIWxxxx or KAINxxxx depending upon which imaging system was used; images from KO-25 will have KBIWxxxx or KBINxxxx as file designations.

In response to K6OYY's inquiry, Mr. Kim also indicated that it is possible for amateur experimenters to process the COLOR images from KO-25! He further stated that the designer of the KO-25 color CCD camera is preparing an article on how to do this.

KO-25 continues transmit strong signals with good modulation quality as received here by K6OYY at Santa Barbara, CA QTH. The Kitsat Team is very busy at the moment conducting experiments with the various systems on KO-25. Mr. Kim reports that one of his collegues has been asked to prepare an article for the AMSAT publications.

[The AMSAT News Service (ANS) would like to thank Jim Shepherd (K6OYY) for the information which went into this bulletin item. For those on who live near the Santa Barbara, CA area, K6OYY is the 75M AMSAT West Coast HF Net

Control Station. Listen for K60YY on 3840 KHz every Tuesday night at 8:00 P.M. PST.]

/EX
SB SAT @ AMSAT $ANS-351.03
MIR COSMONAUTS HEARD

HR AMSAT NEWS SERVICE BULLETIN 351.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-351.03

WA6ZVP Explains Working One Of the Russian Cosmouauts Aboard MIR

WA6ZVP noting one morning this past week that during a MIR pass on the west coast would provide him a good pass for a visual sighting. Getting up just as the spacecraft came above the horizon, he had noted again that the AOS time was about 3 minutes or so before it would pass out of the earth's shadow. With his receiver set to 145.550 MHz, he started to hear the normal packet traffic.

Just as WA6ZVP was about to go outside his house, he started hearing voice traffic but at first thought it was just some of the Los Angeles "locals" going QRMing the frequency and complaining about the packet traffic.

Much to his surprise, however, when WA6ZVP turned the volume up to hear the voice of a cosmonaut speaking broken but very understandable English. The cosmonaut was in a QSO with another station which could not be hear locally or from a mountain top remote.

During the 5 or 6 minutes that I heard him, he did not identify so I don't know what call he is using. Presumably it was R0MIR. The best that WA6ZVP can recall, the cosmonauts have not been on voice for over 4-6 months.

For all those wishing to work R0MIR, please listen first before transmitting packet. As in the case of WA6ZVP, you might be suprised!

[The AMSAT News Service (ANS) would like to thank Roger Wiechman (WA6ZVP) for this bulletin.]

/EX
SB SAT @ AMSAT $ANS-351.04
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 351.04 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-351.04

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO,

OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-351.05
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 351.05 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 18, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-351.05

Weekly OSCAR Status Reports: 18-DEC-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 ! / Eclipses, max
Mode-B : MA 95 to MA 180 ! OFF Dec 07 - 24. < duration 136
Mode-B : MA 180 to MA 218 ! \ minutes.
Mode-S : MA 218 to MA 220 !<- S beacon only
Mode-S : MA 220 to MA 230 !<- S transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
[G3RUH/DB2OS/VK5AGR]

FO-20: The following is the FO-20 operating schedule:
Analog mode: 15-Dec-93 07:41 -to- 22-Dec-93 8:05 UTC
Digital mode: otherwise noted above. [JJ1WTK]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at

your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

486. Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 00:22:00 UTC
From: benjie@hip-hop.sbay.org
Message-ID: <2f2r78$n72@hip-hop.sbay.org>
Source record: 28246
Cross-posted to: rec.radio.amateur.space,sci.space

I am getting interested in satel trackings, and I would like some suggestions on what tracking shareware I should get.

All information are welcome.

Benjie

487. Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 00:23:07 UTC
From: benjie@hip-hop.sbay.org
Message-ID: <2f2r9b$nc3@hip-hop.sbay.org>
Source record: 28247
Cross-posted to: rec.radio.amateur.space,sci.space

I am getting interested in satel tracking, and I would like
suggestions on what tracking shareware I should get.

All information are welcome.

Thanks,

Benjie

488. APT-Satellites: Report DEC 18, 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 08:33:30 UTC
From: peter.henne@gmd.de
Message-ID: <1993Dec20.083330.21875@gmd.de>
Source record: 28248
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
Observed at station 50.7 NLat, 7.1 ELon, DEC 18, 1993

NOAA-9: APT 137.62 On
NOAA-10: APT 137.50 *OFF*
NOAA-11: APT 137.62 On
NOAA-12: APT 137.50 On
Meteor 2-21: APT 137.85 ??
Meteor 3-3: APT 137.30 *OFF*
Meteor 3-5: APT 137.30 On

Meteor 2-21 could not be observed as from the stations
location it passed in the dark or was too far south to
be captured.
Meteor 3-5 performed RF off at 65 deg NLat on its noon-
ascending passes, the 20 lpm low-res IR-transmission was
inactive now.
NOAA-10 APT is off due to VHF-conflict with NOAA-12, this
should end DEC 23 according to TBUS.

+----------------------------------------+
|Peter Henne (peter.henne@gmd.de) |
| (henne@gmd.de) |
|German Nat.Research Center.f.Comp.Science |
|D-5205 St.AUGUSTIN 1 |
|Fed.Rep. of Germany |
+----------------------------------------+
```

489. Re: Some RS Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 09:12:05 UTC
From: kerskine@ftp.com
Message-ID: <kerskine.12.0@ftp.com>
Source record: 28250

Hi Isaac

>Does RS-10 have a reverse linear transponder or a regular one? I'm not
>sure where between 29.360 and 29.400 to find my signal when uplinking on
>2m.

I don't know what type of transponder RS-10 uses, but here's how I figure out where my downlink will be:

If the uplink is 145.890

Then the downlink is 29.390

In other words, match the last two digits (the "90"), While you're listening, send a series of v's by cw and scan up and down 5 hz.

>How do I know which mode RS-10 is using? Does it only use one mode at a
>time, or all modes simulatneously? Which mode does it use the most? Do
>RS-10 and 11 use the same mode at the same time? I am interested in modes
>T and A.

Last I heard, RS-10 is always mode A. Other modes interfere with the payload that it piggybacks on.

>Should I be able to hit RS-10 with 25 watts and a 5/8 vertical (at a very
>high location) consistantly if its high above the horizon? Would changing
>the orientation of the antenna from vertical to horizontal help?

I've done QSO's with a 1/4 wave ground plane and 10 watts. You should do fine with what you have. The fun of the RS sats is that you don't have to worry about pointing antennas.

>How come I can't track RS-12/13 using Traksat and current TLE data?

Don't know on this one.

73...Keith - KA1RHO

490. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 13:06:29 UTC
From: johnsotc@ss1.af.mil
Message-ID: <1993Dec20.130629.9567@afit.af.mil>
Source record: 28249
Cross-posted to: rec.radio.amateur.space,sci.space

In article <2f2r9b$nc3@hip-hop.sbay.org>, benjie@hip-hop.sbay.org (Benjie Chen) writes:
|> I am getting interested in satel tracking, and I would like
|> suggestions on what tracking shareware I should get.
|>
|> All information are welcome.
|>
|> Thanks,
|>
|> Benjie
|>

Try PC-TRACK. It's available as PCT214A.ZIP at oak.oakland.edu (141.210.10.117)
in the /pub/msdos/satelite directory.

Tom

491. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 14:50:11 UTC
From: stephens@geod.emr.ca
Message-ID: <stephens.756399011@ngis>
Source record: 28251
Cross-posted to: rec.radio.amateur.space,sci.space

johnsotc@ss1.af.mil (TOM C. JOHNSON) writes:

>In article <2f2r9b$nc3@hip-hop.sbay.org>, benjie@hip-hop.sbay.org (Benjie Chen) writes:
>|> I am getting interested in satel tracking, and I would like
>|> suggestions on what tracking shareware I should get.
>|>
>|> All information are welcome.
>|>
>|> Thanks,
>|>
>|> Benjie
>|>

>Try PC-TRACK. It's available as PCT214A.ZIP at oak.oakland.edu (141.210.10.117)
>in the /pub/msdos/satelite directory.

>Tom

Depending on what you need, and what computer you are going to try. There are
also: Trak280.zip and Usat92b.zip on that directory. T280 is shareware and Usat
is freeware (I think) with the qb source code. Also if you want to buy
software, AMSAT sells InstantTrack with all the bells and whistles, and will even
drive your antennas for you!

Two Line elements are available from archive.afit.af. mil in the pub/space
directory.

--
Dave Stephenson
Geological Survey of Canada *Too much bad arithmetic is not a *
Ottawa, Ontario, Canada *substitute for not enough good *
Internet: stephens@geod.emr.ca * mathematics *

492. AEA DSP-2232 Software Update?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 18:01:52 UTC
From: Ron.Parsons@f40.n382.z1.fidonet.org
Message-ID: <756415810.AA00278@afarm.uucp>
Source record: 28252

The update was released on Dec 15 or so. It does have up/down control.
Call AEA for ordering. I think it is $30 plus s/h.
Ron W5RKN

493. Re: Some RS Questions

Newsgroup: rec.radio.amateur.space
Date: 1993-12-20 19:14:02 UTC
From: charlier@lsid.hp.com
Message-ID: <CICLFF.5D@hpcvsnz.cv.hp.com>
Source record: 28253

Isaac Trefz (itrefz1@cc.swarthmore.edu) wrote:

: How come I can't track RS-12/13 using Traksat and current TLE data?

I'll let someone more directly knowledgable on RS-10/11 answer your
other questions, but I think I can handle this one.

RS-12/13 is actually physically part of a larger satellite, and the
orbitals that NASA puts out refer to it under that name. Try entering
"Cosmos 2123" as the satellite name and see if that works. If you get
the abbreviated version of the three-line data from AMSAT, they
substitute "RS-12/13" for the name. I prefer to get the AMSAT data
for that reason, and because I'd rather deal with 30 satellites than
180 in my tracking program.

Lots of luck!
--
Charlie Panek KX7L Hewlett Packard Company
charlier@lsid.hp.com Lake Stevens Instrument Division
Everett, Washington

494. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-21 04:51:32 UTC
From: bob@olwejo.UUCP
Message-ID: <CIDC60.CtA@olwejo.UUCP>
Source record: 28254
Cross-posted to: rec.radio.amateur.space,sci.space

In <2f2r9b$nc3@hip-hop.sbay.org>, benjie@hip-hop.sbay.org writes:
>I am getting interested in satel tracking, and I would like
>suggestions on what tracking shareware I should get.

For a UNIX system, (or possibly any computer with a good C compiler
i.e. gcc) SatTrack 1.7 was just released. So far, it's the best
freely-available tracking software I've found for UNIX. SatTrack does
not use X, but vt100 screen mapping.

It's the best UNIX, free, non-X satellite tracker there is.

If anyone's seen better, feel free to let me know!

--
Bob Kupiec, N3MML Internet: bob@zero.com
Morrisville, PA, USA (or) kupiec@jvnc.net
40d12'N 74d49'W +110ft AX.25: n3mml@wb3ftp.#epa.pa.usa.noam
"Motorola 68k Inside!" PGP key 1F9C51 available ~ Get WiReD

495. New Bird: PoSat-1

Newsgroup: rec.radio.amateur.space
Date: 1993-12-21 13:22:41 UTC
From: etruben@ci.ua.pt
Message-ID: <CIDztv.Lo9@news.ci.ua.pt>
Source record: 28255

From: CT1DBS@CS1CRE.CTSR.PRT.EU

PoSat-1 will be available to all radio amateurs from 6 January 1994.
The PoSat-1 will work in JD mode (digital J mode)
The sattelite primary mode will be in FSK, at 9600 bps,
with PacSat protocol.
THE PACKET SOFTWARE USUALY USED WILL NOT WORK BECAUSE IT'S A
DIFERENT SERVER.
It's necessary to use the software PB/PG commonly used in oscar 22
23, 25 and 26.

The uplink and downlink frequencies :

UPLINK
Primary Freq. - 145.975 MHz
Alternative Freq. - 145.925 MHz

DOWNLINK
Primary Freq. - 435.075 MHz
Alternative Freq. - 435.050 MHz

For work with the PoSat it will be necessary to use a tracking system
and have a good reception and emission . Automatic Doppler correction, +25 W
uplink and a pre-amplifier in downlink antenna will be necessary.
Right Circular Polarization in antena give better results.
For reception it's enough a normal omnidireccional antenna.

The PoSat schedule will be determinated by a comission established
with two Portuguese Marconi Co. members and two Amsat-Po members.

The first meeting will be in 13 December 1993.
As soon as the schedule is defined we will informe you.

For more information send a SASE to AMSAT-PO.

AMSAT-PO - P.O. Box 227 - 2003 SANTAREM CODEX - PORTUGAL

73

--
Ruben Mendes] Dept. Electronica e Telecomunicacoes
E-Mail : etruben@zeus.ci.ua.pt] Universidade de Aveiro
Ham Callsign: CT1ETZ] 3800 Aveiro
Phone : +351 34 28032] PORTUGAL

496. 10m rx

Newsgroup: rec.radio.amateur.space
Date: 1993-12-22 03:43:40 UTC
From: esj@harvee.billerica.ma.us
Message-ID: <H.eg.MmJ9EeMZVZc@harvee.billerica.ma.us>
Source record: 28259

I have a 2m multi-mode rig (ft-290II) and I would like to use the RS10 sat. other than buying an HF rx, what can I use for good, cheap, 10m rx capability? rx converter? Directo conversion receiver like something based on the ne602?

Thanks!

--- eric
--
HOME: esj@harvee.billerica.ma.us HAM ka1eec
WORK: esj@temerity.polaroid.com 617.386.4687
source of the public's fear of the unknown since 1956

497. Need contacts on AO-21 for WAS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-22 17:27:49 UTC
From: kohlwey@nu.sim.es.com
Message-ID: <2fa02l$1qe@cnn.sim.es.com>
Source record: 28256

Since it looks like AO-21 may be changing modes soon (SpaceNews,
MONDAY DECEMBER 20, 1993); it's time that I finish Working All States
on this bird.

I have DELAWARE, IDAHO, MISSISSIPPI, RHODE ISLAND, VERMONT and WYOMING left.

I would like to hear from anyone who is willing to give me a contact on AO-21
from one of these states. If you can't but know someone on the birds from
these states please e-mail me who they are. If you talk to them ask them to get
on AO-21!

The uplink is on 435.015 FM and downlink is around 145.990 FM. I have worked
several mobil stations. A 4 element yagi and 35 watts should get you in on
the best passes.

73, Randy, N7SFI

E-MAIL n7sfi@amsat.org

498. HF shuttle audio feed

Newsgroup: rec.radio.amateur.space
Date: 1993-12-22 19:13:00 UTC
From: rstackho@dw3f.ess.harris.com
Message-ID: <1993Dec22.191300.4997@mlb.semi.harris.com>
Source record: 28257

Does anyone know of a freq for HF monitoring of Shuttle Audio Feed?
Please E-mail me directly since I cannot get directly onto News.
thanks!

499. HF freqs for Shuttle Audio

Newsgroup: rec.radio.amateur.space
Date: 1993-12-22 19:15:50 UTC
From: rstackho@dw3f.ess.harris.com
Message-ID: <1993Dec22.191550.5072@mlb.semi.harris.com>
Source record: 28258

Does anyone have a freq for HF monitoring of Shuttle Feed?

Please E-mail me directly as I have no direct USnews.

500. MIR QSL Info needed Please!!!!!

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 03:40:27 UTC
From: jeff@ve6mgs.ampr.ab.ca
Message-ID: <CIGy7G.LqH@ve6mgs.ampr.ab.ca>
Source record: 28260

Hello All,
I need the QSL address for Mir! 73 de Jeff

501. Re: 10m rx

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 09:12:25 UTC
From: kerskine@ftp.com
Message-ID: <kerskine.13.0@ftp.com>
Source record: 28367

Hi Eric,

What I use for my downlink receiver is a Radio Shack HT-100. I've seen them at flea markets for $125, and I think you could talk someone down to $100.

If you build a direct conversion receiver, I think a lot of us here would be interested in you results. I've tried in vain to find any sort of plan for building a 2m CW/SSB transmitter.

Good luck....Keith - KA1RHO

502. Santa in orbit?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 17:36:11 UTC
From: koffer@indial1.io.com
Message-ID: <2fckuc$3t0@illuminati.io.com>
Source record: 28361

According to the satellite tracking program I have, the Hubble Space Telescope will pass over Austin on Friday, Christmas Eve. It will be visible from 6:05pm CST to 6:09pm CST, and will track from west to east, reaching a maximum elevation of 69 degrees (i.e. near overhead) off the horizon to the south.

It will appear as a bright, star-like object. Parents with small children may want to show them "Santa-Claus". Tell them heUs gonna make a stop off in Houston and then back-track after bedtime ;^).

I feel pretty sure about this prediction. I got the December 17th orbital elements from NORAD off an internet site. During the recent HST repair mission, the visibility predictions were very accurate.

Residents in Texas and other southern states east of Texas should be able to see Hubble shortly afterwards. It will be hugging the southern coastline of the US and pass over northern Florida about 5:11pm PST.

Enjoy!

+------------------+-------------------------+
Ken Offer	Gemini Dreams
Chief of Bits	Shareware software for
koffer@io.com	the Macintosh
+------------------+-------------------------+
| My opinions are not necessarily yours, |
| but we do have the RIGHT to disagree... |
+---+

503. Re: 10m rx

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 17:36:14 UTC
From: n4nr@vulcan.com
Message-ID: <4qu1ec1w165w@vulcan.com>
Source record: 28365

> I have a 2m multi-mode rig (ft-290II) and I would like to use the RS10
> sat. other than buying an HF rx, what can I use for good, cheap, 10m rx
> capability? rx converter? Directo conversion receiver like something based
> on the ne602?
>
>
The UNIDEN 2510 or 2600, or the Radio Shack version of this radio would
make good RS-10 receivers. With the sunspot cycle near bottom, I have
seen a lot of them for sale used for around $100...The Radio Shack
version sometimes shows oup for $75...AES is closing out this model as
well.
q

e
q
?
/e
/d

73 de Dennis Dease - N4NR

Internet: n4nr@vulcan.com
n4nr@amsat.org
Packet: n4nr@kd4cim.al.usa.na

504. * SpaceNews 27-Dec-93 *

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 17:38:34 UTC
From: John Magliacane <kd2bd@ka2qhd.de.com>
Message-ID: <$spc1227.1993@ampr.org>
Source record: 28366
Cross-posted to: rec.radio.amateur.space,sci.space.news,rec.radio.info

SB NEWS @ AMSAT $SPC1227
* SpaceNews 27-Dec-93 *

BID: $SPC1227

=========
SpaceNews
=========

MONDAY DECEMBER 27, 1993

SpaceNews originates at KD2BD in Wall Township, New Jersey, USA. It is published every week and is made available for unlimited distribution.

* AO-21 GOES MULTIMEDIA *
========================
As reported last week in SpaceNews, the RUDAK group of AMSAT-DL achieved another milestone with the development of more sophisticated software for the OSCAR-21/RUDAK satellite.

Although some key members are already very busy with P3D activities, much time has been invested to implement new attractive modes on AO21.

Besides the Voice Broadcast which was successfully used throughout the last year with several greeting messages in different languages, RUDAK is now capable of transmitting picture files in WEFAX compatible format. Unfortunately there is no camera onboard AO-21, so the pictures have to be uploaded first by the AO-21 command station.

Not only is RUDAK now capable of transmitting FAX pictures, the pictures themselves are uploaded and stored in JPEG format! They are also converted from JPEG to WEFAX format online by the RTX-2000 RISC processor during transmission, so not much memory is needed to hold the images.

JPEG compression gives an enormous reduction in file size compared to GIF picture format, without much loss in quality. This saves a lot of space in the 1MB RAMDISK and will also speed-up the upload time drastically.

RUDAK is also capable of holding several picture and voice broadcast files in the RAMDISK at the same time. They can be transmitted on a schedule mixed with FM-Mode and 1200 baud AX.25 Telemetry.

The "Multimedia" satellite premiere will be activated for the first time on December 24 and some special season greeting in voice and picture will be transmitted.

Stay tuned on AMSAT OSCAR-21 and be prepared for some surprises!

The RUDAK downlink center frequency is 145.987 MHz. The uplink for FM-Mode is 435.014 MHz. The WEFAX format is like METEOSAT WEFAX Specification (MGCS): FM, 2400 Hz Subcarrier frequency with double sideband AM modulation, 300 Hz start signal for 3 seconds, 450 Hz stop signal for 5 seconds, 800 x 800 Pixel Image format with 256 grey levels, 4 Lines/sec.

* MERRY CHRISTMAS and a HAPPY NEW YEAR *
AMSAT-DL, Germany and AMSAT-U, Russia

[Info via Peter Guelzow]

* SANTA GETS CLEARANCE *
==========
To all our friends who have participated in SAREX operations this past year:

The Kennedy Space Center has given clearance for Santa to land on the Shuttle landing strip. The folks in Mission Control have given their go ahead for deorbit burn and landing operations. Engineering has declared all systems operating properly and the range safety officer has cleared the landing area of all interfering craft. We are ready for final Christmas operations.

We trust that our friends in the north have taken good care of Santa's Reindeer during this past year and all systems are go.

We here at the Johnson Space Center and the SAREX team send our Seasons Greetings and Wishes for a Happy New Year.

[Info via Lou McFadin, W5DID at the NASA Johnson Space Center]

* 2 METER AMSAT NET *
==========
All interested are invited to check in to the WA2SNQ repeater satellite net, on the 147.075 MHz repeater in Dix Hills, Long Island. Beginners are welcome, as are old hands. We are especially looking for PACSAT users. There will soon be a Oscar 13 gateway in operation during good AO13 passes during net time. Please stop in and say hello Tuesday nites at 7 PM.

[Info via Scott, WB2UZR @ WA2NDV.#NLI.NY.USA.NA]

* CELESTIAL BBS NUMBER CHANGE *
==========
The telephone number of the Celestial land-line BBS system will change effective 6 January 1994 from 513/427-0674 to 513/253-9767.

[Info via WX8X]

* NEW AMSAT LAND-LINE BBS *
==========
Dave, KB9BNR has added a land line port to his packet radio BBS (QCBBS), a F6FBB packet BBS with three RF ports supporting RF data rates from 1200 to 9600 baud.

The BBS has a very nice satellite section containing realtime satellite tracking facilities as well as text files on each Amateur satellite. There

are also back issues of SpaceNews and ANS bulletins available, and Dave hopes to add a bigger hard disk soon and include much more information. There are also lots of other Ham Radio files on the system, such as radio mods, SWL frequency lists, and much more.

On your first connect to the system you will have read only status. You can send Dave a message if you would like full access to the system. Simply provide your name and callsign and select a password for your login and pass it along to Dave. The next time you connect, you will have full access to the system.

The telephone number is 309-797-3827. The BBS supports baud rates from 300 to 9600 baud, with 8N1 data format and is available 24 hours a day.

[Info via Dave, KB9BNR]

* FO-20 OPERATION SCHEDULE *
==========
The following is the FO-20 operation schedule for December 1993 through February 1994. During this period, the analog and digital transponder modes will on alternately for a week as they were in December.

ANALOG MODE:

15-Dec-93 7:41 -to- 22-Dec-93 8:05 UTC
29-Dec-93 8:30 -to- 05-Jan-94 8:50 UTC
12-Jan-94 7:30 -to- 19-Jan-94 7:50 UTC
26-Jan-94 8:20 -to- 02-Feb-94 6:50 UTC
09-Feb-94 7:15 -to- 16-Feb-94 7:40 UTC

The digital (Mode JD) transponder is available at all other times.

[Info via Kazu Sakamoto, JJ1WTK]

* THANKS! *
==========
Thanks to all those who sent messages of appreciation regarding SpaceNews, especially:

G3IOR N3JIX W3PYF AA4MI ZS5FR KD6ILO YT7MPB
WD8LAQ F9XG Frank L. Weissferdt

* FEEDBACK/INPUT WELCOMED *
==========
Mail to SpaceNews should be directed to the editor (John, KD2BD) via any of the following paths:

FAX : 1-908-747-7107
PACKET : KD2BD @ N2KZH.NJ.USA.NA
INTERNET : kd2bd@ka2qhd.ocpt.ccur.com -or- kd2bd@amsat.org

MAIL : John A. Magliacane, KD2BD
Department of Engineering and Technology
Advanced Technology Center

Brookdale Community College
Lincroft, New Jersey 07738
U.S.A.

<<=- SpaceNews: The first amateur newsletter read in space! -=>>

/EX

--
John A. Magliacane, KD2BD * /\/\ * Voice : 1-908-224-2948
Advanced Technology Center |/\/\/\| Packet : KD2BD @ N2KZH.NJ.USA.NA
Brookdale Community College |\/\/\/| Internet: kd2bd@ka2qhd.ocpt.ccur.com
Lincroft, NJ 07738 * \/\/ * Morse : -.- -.. ..--- -... -..

505. Re: MIR QSL Info needed Please!!!!!

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 17:48:48 UTC
From: haber
Message-ID: <haber-231293124803@fp11.camb.inmet.com>
Source record: 28362

In article <CIGy7G.LqH@ve6mgs.ampr.ab.ca>, jeff@ve6mgs.ampr.ab.ca (Jeff Macus) wrote:
>
> Hello All,
> I need the QSL address for Mir! 73 de Jeff

From 01.01.93 new QSL Manager for cosmonauts is RV3DR.
All QSL's should be sent to:

RV3DR-Serge Samburov, Space QSL Manager
P.O.141070, BOX 73, Kaliningrad-10 city, Moscow Area,
RUSSIA.

or direct:

P.O.141070,Kaliningrad city, Moscow Area,
prospekt Cosmonavtov, dom 36, kw 96, RUSSIA

BEST 73
Chief of Cosmonaut Amateur Radio Department NPO "Energia"
RV3DR

73 de ua3cr@rk3kp.rus.eu or advclub@sovam.com

+---+
+ Nothing is for sure until it is over then, it is only highly probable +
+---+
+ Steve Haber Systems Development & Integration (617) 661-1440 x 4235 +
+ Intermetrics Inc. 733 Concord Ave. Cambridge MA 02138 +
+---+
+ Amateur Radio N1LHW AFMARS AFT1FV Civil Air Patrol NH Profile 175 +
+ Pilot of Hot Air Balloons, Gliders, Fixed Wing +
+---+

506. Re: 10m rx

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 20:23:19 UTC
From: greg@core.rose.hp.com
Message-ID: <CII8Mv.DoJ@icon.rose.hp.com>
Source record: 28363

Eric,

I use my Radio Shack DX440 shortwave receiver. Turn on the BFO and you're all set. I use a 3/2 wave wire antenna with it. Works fine.

Greg. KD6KGW

507. Electronic Journal of the ASA (EJASA) - December 1993

Newsgroup: rec.radio.amateur.space
Date: 1993-12-23 21:41:55 UTC
From: klaes@verga.enet.dec.com
Message-ID: <2fd2vm$a65@nntpd.lkg.dec.com>
Source record: 28364
Cross-posted to: rec.radio.amateur.space,rec.radio.amateur.misc

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Volume 5, Number 5 - December 1993

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ASA MEMBERSHIP INFORMATION

The Electronic Journal of the Astronomical Society of the Atlantic (EJASA) is published monthly by the Astronomical Society of the Atlantic, Incorporated. The ASA is a non-profit organization dedicated to the advancement of amateur and professional astronomy and space exploration, as well as the social and educational needs of its members.

ASA membership application is open to all with an interest in astronomy and space exploration. Members receive the Journal of the ASA (the JASA is a hardcopy sent through United States Mail and is not a duplicate of this Electronic Journal) and the Astronomical League's REFLECTOR magazine. Members may also purchase discount subscriptions to ASTRONOMY and SKY & TELESCOPE magazines.

For information on membership, you may contact the Society at any of the following addresses:

Astronomical Society of the Atlantic (ASA)
P. O. Box 15038
Atlanta, Georgia 30333-9998
U.S.A.

asa@chara.gsu.edu (For ASA issues)
klaes@verga.enet.dec.com (For EJASA issues)

ASA BBS: (404) 321-5904, 300/1200/2400 Baud

or telephone the Society Recording at (404) 264-0451 to leave your address and/or receive the latest Society news.

ASA Officers and Council -

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ARTICLE SUBMISSIONS

Article submissions to the EJASA on astronomy and space exploration are most welcome. Please send your on-line articles in ASCII format to Larry Klaes, EJASA Editor, at the following net addresses or the above Society addresses:

klaes@verga.enet.dec.com
or - ...!decwrl!verga.enet.dec.com!klaes
or - klaes%verga.dec@decwrl.enet.dec.com
or - klaes%verga.enet.dec.com@uunet.uu.net

You may also use the above addresses for EJASA back issue requests, letters to the editor, and ASA membership information.

When sending your article submissions, please be certain to include either a network or regular mail address where you can be reached, a telephone number, and a brief biographical sketch.

Back issues of the EJASA are also available from the ASA anonymous FTP site at chara.gsu.edu (131.96.5.29). Directory: /ejasa

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DETECTABILITY OF EXTRATERRESTRIAL TECHNOLOGICAL ACTIVITIES

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1 - Visiting Fellow under ICSC World Laboratory scholarship.
Present address: University of Buenos Aires, C.C.8-Suc.25, 1425-
Buenos Aires, Argentina

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This paper was originally presented at the
Second United Nations/European Space Agency Workshop
on Basic Space Science

Co-organized by The Planetary Society in cooperation with the
Governments of Costa Rica and Colombia, 2-13 November 1992,
San Jose, Costa Rica - Bogota, Colombia

==========

Introduction

If we want to find evidence for the existence of extraterrestrial civilizations (ETC), we must work out an observational strategy for detecting this evidence in order to establish the various physical quantities in which it involves. This information must be carefully analyzed so that it is neither over-interpreted nor overlooked and can be checked by independent researchers.

The physical laws that govern the Universe are the same everywhere, so we can use our knowledge of these laws to search for evidence that would finally lead us to an ETC. In general, the experimentalist studies a system by imposing constraints and observing the system's response to a controlled stimulus. The variety of these constraints and stimuli may be extended at will, and experiments can become arbitrarily complex. In the problem of the Search for Extraterrestrial Intelligence (SETI), as well as in conventional astronomy, the mean distances are so huge that the "researcher" can only observe what is received. He or she is entirely dependent on the carriers of information that transmit to him or her all he or she may learn about the Universe.

Information carriers, however, are not infinite in variety. All information we currently have about the Universe beyond our solar system has been transmitted to us by means of electromagnetic radiation (radio, infrared, optical, ultraviolet, X-rays, and gamma rays), cosmic ray particles (electrons and atomic nuclei), and more recently by neutrinos. There is another possible physical carrier, gravitational waves, but they are extremely difficult to detect.

For the long future of humanity, there have also been specula-tions about interstellar automatic probes that could be sent for the detection of extrasolar life forms around the nearby stars. Another set of possibilities could be the detection of extraterrestrial

artifacts in our solar system, left here by alien intelligences that want to reveal their visits to us.

Table 1 summarizes the possible "information carriers" that may let us find the evidence of an extraterrestrial civilization, according to our knowledge of the laws of physics. The classification of techniques in Table 1 is not intended to be complete in all respects. Thus, only a few fundamental particles have been listed. No attempt has been made to include any antiparticles. This classification, like any such scheme, is also quite arbitrary. Groupings could be made into different "astronomies".

TABLE 1: Information Carriers

|-
| Radio Waves
| Infrared Rays
|- | Optical Rays
| Photon Astronomy| Ultraviolet Rays
| | X-Rays
Boson | | Gamma Rays
Astronomy | |-
| Graviton Astronomy: Gravity Waves
|- |-
| Neutrinos
|- |- Fermions| Electrons |-
| Atomic | | Protons | Cosmic
| Microscopic| |- | Rays
| Particles | Heavy Particles |-
Particle | |-
Astronomy | |-
| Macroscopic Particles| Meteors, meteorites,
or objects	meteoritic dust
-
Space Probes
Direct	Manned Exploration
Techniques	ET Astroengineering Activities in the Solar System
-

The methods of collecting this information as it arrives at the planet Earth make it immediately obvious that it is impossible to gather all of it and measure all its components. Each observation technique acts as an information filter. Only a fraction (usually small) of the complete information can be gathered. The diversity of these filters is considerable. They strongly depend on the available technology at the time.

In this paper a review of the advantages and disadvantages of each "physical carrier" is examined, including the case that the possible ETCs are using them for interstellar communication purposes, as well as the possibility of detection activities of extraterrestrial

technologies.

Classification of Extraterrestrial Civilizations

The analysis of the use of each information carrier are deeply connected with the assumption of the level of technology of the other civilization.

Kardashev (1964) established a general criteria regarding the types of activities of extraterrestrial civilizations which can be detected at the present level of development. The most general parameters of these activities are apparently ultra-powerful energy sources, harnessing of enormous solid masses, and the transmission of large quantities of information of different kinds through space. According to Kardashev, the first two parameters are a prerequisite for any activity of a supercivilization. In this way, he suggested the following classification of energetically extravagant civilizations:

TYPE I: A level "near" contemporary terrestrial civilization with an energy capability equivalent to the solar insolation on Earth, between 10exp16 and 10exp17 Watts.

TYPE II: A civilization capable of utilizing and channeling the entire radiation output of its star. The energy utilization would then be comparable to the luminosity of our Sun, about 4x1026 Watts.

TYPE III: A civilization with access to the power comparable to the luminosity of the entire Milky Way galaxy, about 4x10exp37 Watts.

Kardashev also examined the possibilities in cosmic communication which attend the investment of most of the available power into communication. A Type II civilization could transmit the contents of one hundred thousand average-sized books across the galaxy, a distance of one hundred thousand light years, in a total transmitting time of one hundred seconds. The transmission of the same information intended for a target ten million light years distant, a typical intergalactic distance, would take a transmission time of a few weeks. A Type III civilization could transmit the same information over a distance of ten billion light years, approximately the radius of the observable Universe, with a transmission time of just three seconds.

Kardashev and Zhuravlev (1992) considered that the highest level of development corresponds to the highest level of utilization of solid space structures and the highest level of energy consumption. For this assumption, they considered the temperature of solid space structures in the range 3 Kelvin s T s 300 K, the consumption of energy in the range 1 Luminosity (Sun) s L s 10exp12 L(Sun), structures with sizes up to 100 kiloparsecs (kpc), and distances up to Dw 1000 megaparsecs (mpc). One parsec equals 3.26 light years.

Searching for these structures is the domain of millimeter wave astronomy. For the 300 Kelvin technology, the maximum emission occurs in the infrared region (15-20 micrometers) and searching is accomplished with infrared observations from Earth and space. The existing radio surveys of the sky (lambda = 6 centimeters (cm) on the ground and lambda = 3 millimeters (mm) for the Cosmic Background Explorer (COBE) satellite) place an essential limit on the abundance of ETC 3 Kelvin technology. The analyzes of the Infrared Astronomical Satellite (IRAS) catalog of infrared sources sets limitations on the abundance of 300 Kelvin technology.

Information Carriers and the Manifestations of Advanced Technological Civilizations

Boson and Photon Astronomy

Electromagnetic radiation carries virtually all the information on which modern astrophysics is built. The production of electromagnetic radiation is directly related to the physical conditions prevailing in the emitter. The propagation of the information carried by electromagnetic waves (photons) is affected by the conditions along its path. The trajectories it follows depend on the local curvature of the Universe, and thus on the local distribution of matter (gravitational lenses), extinction affecting different wavelengths unequally, neutral hydrogen absorbing all radiation below the Lyman limit (91.3 mm), and absorption and scattering by interstellar dust, which is more severe at short wavelengths.

Interstellar plasma absorbs radio wavelengths of kilometers and above, while the scintillations caused by them become a very important effect for the case of ETC radio messages (Cordes and Lazio, 1991). The inverse Compton effect lifts low-energy photons to high energies in collisions with relativistic electrons, while gamma and X-ray photons lose energy by the direct Compton effect. The radiation reaching the observer thus bears the imprint of both the source and the accidents of its passage though space.

The Universe observable with electromagnetic radiation is five-dimensional. Within this phase, four dimensions - frequency coverage plus spatial, spectral, and temporal resolutions - should properly be measured logarithmically with each unit corresponding to one decade (Tarter, 1984). The fifth dimension is polarization, which has four possible states: Circular, linear, elliptical, and unpolarized. This increases the volume of logarithmic phase space fourfold.

It is useful to attempt to estimate the volume of the search space which may need to be explored to detect an ETC signal. For the case of electromagnetic waves, we have a "Cosmic Haystack" with an eight-dimensional phase space. Three spatial dimensions (coordinates of the source), one dimension for the frequency of emission, two dimensions for the polarization, one temporal dimension to synchronize trans-missions with receptions, and one dimension for the sensitivity of the receiver or the transmission power.

If we consider only the microwave region of the spectrum (300 megahertz (MHz) to 300 gigahertz (GHz)), it is easy to show that this Cosmic Haystack has roughly 10exp29 cells, each of 0.1 Hz bandwidth, per the number of directions in the sky in which an Arecibo (305-meter) radio telescope would need to be pointed to conduct an all-sky survey, per a sensitivity between 10exp(-20) and 10exp(-30) [W m-2], per two polarizations. The temporal dimension (synchronization between transmission and reception) was not considered in the calculation. The number of cells increase dramatically if we expand our search to other regions of the electromagnetic spectrum. Until now, only a small fraction of the whole Haystack has been explored (w 10exp(-15) - 10exp(-16)).

TABLE 2: Characteristics of the Electromagnetic Spectrum

(All the numbers that follows each 10 are exponents.)

Spectrum Region	Frequency Region [Hz]	Wavelength Region [m]	Minimum Energy per photon [eV]
Radio	3x106-3x1010	100-0.01	10-8 - 10-6
Millimeter	3x1010-3x1012	0.01-10-4	10-6 - 10-4
Infrared	3x1012-3x1014	10-4-10-6	10-4 - 10-2
Optical	3x1014-1015	10-6-3x10-7	10-2 - 5
Ultraviolet	1015-3x1016	3x10-7-10-8	5 - 102
X-rays	3x1016-3x1019	10-8-10-11	102 - 105
Gamma-rays	r3x1019	s10-11	r105

Radio Waves

In the last thirty years, most of the SETI projects have been developed in the radio region of the electromagnetic spectrum. A complete description of the techniques that all the present and near-future SETI programs are using for detecting extraterrestrial intelligence radio beacons can be found elsewhere (e.g., Horowitz and Sagan, 1993). The general hypothesis for this kind of search is that there are several civilizations in the galaxy that are transmitting omnidirectional radio signals (civilization Type II), or that these civilizations are beaming these kind of messages to Earth. In this section we will discuss only the detectability of extraterrestrial technological manifestations in the radio spectrum.

Domestic Radio Signals

Sullivan et al (1978) and Sullivan (1981) considered the possibility of eavesdropping on radio emissions inadvertently "leaking" from other technical civilizations. To better understand the information which might be derived from radio leakage, the case of our planet Earth was analyzed. As an example, they showed that the United States Naval Space Surveillance System (Breetz, 1968) has an effective radiated power of 1.4x10exp (10) watts into a bandwidth of only 0.1 Hz. Its beam is such that any eavesdropper in the declination

range of zero to 33 degrees (28 percent of the sky) will be illuminated daily for a period of roughly seven seconds. This radar has a detectability range of leaking terrestrial signals to sixty light years for an Arecibo-type (305-meter) antenna at the receiving end, or six hundred light years for a Cyclops array (one thousand dishes of 100-meter size each).

Recently Billingham and Tarter (1992) estimated the maximum range at which radar signals from Earth could be detected by a search similar to the NASA High Resolution Microwave Survey (HRMS) assumed to be operating somewhere in the Milky Way galaxy. They examined the transmission of the planetary radar of Arecibo and the ballistic missile early warning systems (BMEWS). For the calculation of maximum range R, the standard range equation is:

R=(EIRP/(4PI PHImin))exp(1/2)

Where PHImin is the sensitivity of the search system in [W m-2]. For the NASA HRMS Target Search PHImin = 10exp (-27) and for the NASA HRMS Sky Survey PHImin w 10exp(-23) (f)exp(1/2), where f is the frequency in GHz. Table 3 shows the distances where the Arecibo and BMEWS transmissions could be detected by a similar NASA HRMS spectrometer.

TABLE 3: HRMS Sensitivity for Earth's Most Powerful Transmissions:

++

ARECIBO PLANETARY RADAR

(1) TARGETED SEARCH MAXIMUM RANGE (light years)

Unswitched
With CW detector 4217
With pulse detector 2371
Switched
With CW detector 94
With pulse detector 290

(2) SKY SURVEY

Unswitched
CW detector 77
Switched
CW detector 9

BMEWS

(1) TARGETED SEARCH
Pulse transmit CW detector 6
Pulse transmit pulse detector 19

(2) SKY SURVEY
Pulse transmit CW detector 0.7

++

All these calculations assumed that the transmitting civilization is at the same level of technological evolution as ours on Earth.

Von Hoerner (1961) classified the possible nature of the ETC signals into three general possibilities: Local communication on the other planet, interstellar communication with certain distinct partners, and a desire to attract the attention of unknown future partners. Thus he named them as local broadcast, long-distance calls, and contacting signals (beacons). In most of the past fifty SETI radio projects, the strategy was with the hypothesis that there are several civilizations transmitting omnidirectional beacon signals. Unfortunately, no one has been able to show any positive evidence of this kind of beacon signal.

Another possibility is the radio detection of interstellar communi-cations between an ETC planet and possible space vehicles. Vallee and Simard-Normandin (1985) carried out a search for these kind of signals near the galactic center. Because one of the characteristics of arti-ficial transmitters (television, radar, etc.) is the highly polarized signal (Sullivan et al, 1978), these researchers made seven observing runs of roughly three days each in a program to scan for strongly polarized radio signals at the wavelength of lambda=2.82 cm.

Radar Warning Signals

Assuming that there is a certain number N of civilizations in the galaxy at or beyond our own level of technical facility, and considering that each civilization is on or near a planet of a Main Sequence star where the planetoid and comet impact hazards are considered as serious as here, Lemarchand and Sagan (1993) considered the possibility for detecting some of these "intelligent activities" developed to warn of these potentially dangerous impacts.

Because line-of-sight radar astrometric measurements have much finer intrinsic fractional precision than their optical plane-of-sight counterparts, they are potentially valuable for refining the knowledge of planetoid and comet orbits. Radar is an essential astrometric tool, yielding both a direct range to a nearby object and the radial velocity (with respect to the observer) from the Doppler shifted echo (Yeomans et al, 1987, Ostro et al, 1991, and Yeomans et al, 1992).

Since in our solar system, most of Earth's nearby planetoids are discovered as a result of their rapid motion across the sky, radar observations are therefore often immediately possible and appropriate. A single radar detection yields astronomy with a fractional precision that is several hundred times better than that of optical astrometry. The inclusion of radar with the optical data in the orbit solution can quickly and dramatically reduce future ephemeris uncertainty. It provides both impact parameter and impact ellipse estimates. This kind of radar research gives a clearer picture of the object to be intercepted and the orientation of asymmetric bodies prior to

interception. This is particularly important for eccentric or multiple objects.

Radar is also the unique tool capable for making a survey of such small objects at all angles with respect to the central star. It can also measure reflectivity and polarization to obtain physical characteristics and composition.

For this case, we can assume that each of the extraterrestrial civilizations in the galaxy maintains as good a radar planetoid and/or comet detection and analysis facility as is needed, either on the surface of their planet, in orbit, or on one of their possible moons.

The threshold for the Equivalent Isotropic Radiated Power (EIRP) of the radar signal could be roughly estimated by the size of the object (D) that they want to detect (according to the impact hazard) and the distance to the inhabited planet (R), in order to have enough time to avoid the collision.

One of the most important issues for the success of SETI observations on Earth is the ability of an observer to detect an ETC signal. This factor is proportional to the received spectral flux density of the radiation. That is, the power per unit area per unit frequency interval. The flux density will be proportional to the EIRP divided by the spectral bandwidth of the transmitting radar signals B.

The EIRP is defined as the product of the transmitted power and directive antenna gain in the direction of the receiver as EIRP = PT.G, where PT is the transmitting power and G the antenna gain. This quantity has units of [W/Hz].

According to the kind of object that the ETC wants to detect (nearby planetoids, comets, spacecraft, etc.), the distance from the radar system and the selected wavelength, a galactic civilization that wants to finish a full-sky survey in only one year, will arise from a modest "Type 0" (w10exp13 W/Hz, Rw0.4 A.U., Dw5000 m, and lambdaw1 m) to the transition from "Type I" to "Type II" (w2x10exp24 W/Hz, Rw0.4 A.U., Dw10 m, lambdaw1 mm).

Lemarchand and Sagan (1993) also presented a detailed description of the expected signal characteristics, as well as the most favorable positions in the sky to find one of these signals. They also have compared the capability of detection of these transmissions by each present and near future SETI projects.

Infrared Waves

There have been some proposals to search in the infrared region for beacon signals beamed at us (Lawton, 1971, and Townes, 1983). Basically, the higher gain available from antennas at shorter wavelengths (up to 10exp14 Hz) compensates for the higher quantum noise in the receiver and wider noise bandwidth at higher frequencies. One concludes that for the same transmitter powers and directed

transmission which takes advantage of the high gain, the detectable signal-to-noise ratio is comparable at 10 micro-m and 21 cm. Since non-thermal carbon dioxide (CO2) emissions have been detected in the atmospheres of both Venus and Mars (Demming and Mumma, 1983), Rather (1991) suggested the possibility that an advanced society could construct transmitters of enormous power by orbiting large mirrors to create a high-gain maser from the natural amplification provided by the inverted atmospheric lines.

An observation program around three hundred nearby solar-type stars has just begun (Tarter, 1992) by Albert Betz (University of Colorado) and Charles Townes (University of California at Berkeley). These observations are currently being made on one of the two 1.7-meter elements of an IR interferometer at Mount Wilson observatory. On average, 21 hours of observing time per month is available for searching for evidence of technological signals.

Dyson (1959, 1966) proposed the search for huge artificial biospheres created around a star by an intelligent species as part of its technological growth and expansion within a planetary system. This giant structure would most likely be formed by a swarm of artificial habitats and mini-planets capable of intercepting essentially all the radiant energy from the parent star.

According to Dyson (1966), the mass of a planet like Jupiter could be used to construct an immense shell which could surround the central star, having a radius of one Astronomical Unit (A.U.). The volume of such a sphere would be 4cr2S, where r is the radius of the sphere (1 A.U.) and S the thickness. He imagined a shell or layer of rigidly built objects Dw10exp6 kilometers in diameter arranged to move in orbits around the star. The minimum number of objects required to form a complete spherical shell [2] is about N=4 PIrexp2/Dexp2w2x10exp5 objects.

This kind of object, known as a "Dyson Sphere", would be a very powerful source of infrared radiation. Dyson predicted the peak of the radiation at ten micrometers.

The Dyson Sphere is certainly a grand, far-reaching concept. There have been some investigations to find them in the IRAS database (V. I. Slysh, 1984; Jugaku and Nishimura, 1991; and Kardashev and Zhuravlev, 1992).

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2 - The concept of this extraterrestrial construct was first described in the science fiction novel STAR MAKER by Olaf Stapledon in 1937.
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Optical Waves

In the radio domain, there have been several proposals to use the visible region of the spectrum for interstellar communications. Since

the first proposal by Schwartz and Townes (1961), intensive research has been performed on the possible use of lasers for interstellar communication.

Ross (1979) examined the great advantages of using short pulses in the nanosecond regime at high energy per pulse at very low duty cycle. This proposal was experimentally explored by Shvartsman (1987) and Beskin (1993), using a Multichannel Analyzer of Nanosecond Intensity Alterations (MANIA), from the six-meter telescope in Russia. This equipment allows photon arrival times to be determined with an accuracy of 5x10exp(-8) seconds, the dead time being 3x10exp(-7) seconds and the maximum intensity of the incoming photon flux is 2x10exp4 counts/seconds.

In 1993, MANIA was used from the 2.15-meter telescope of the Complejo Astronomico El Leoncito in Argentina, to examine fifty nearby solar-type stars for the presence of laser pulses (Lemarchand et al, 1993).

Other interesting proposals and analysis of the advantages of lasers for interstellar communications have been performed by Betz (1986), Kingsley (1992), Ross (1980), and Rather (1991).

The first international SETI in the Optical Spectrum (OSETI) Conference was organized by Stuart Kingsley, under the sponsorship of The International Society for Optical Engineering, at Los Angeles, California, in January of 1993.

There have also been independent suggestions by Drake and Shklovskii (Sagan and Shklovskii, 1966) that the presence of a technical civilization could be announced by the dumping of a short-lived isotope, one which would not ordinarily be expected in the local stellar spectrum, into the atmosphere of a star. Drake suggested an atom with a strong, resonant absorption line, which may scatter about 10exp8 photons sec -1 in the stellar radiation field. A photon at optical frequencies has an energy of about 10exp(-12) erg or 0.6 eV, so each atom will scatter about 10exp(-4) erg sec-1 in the resonance line. If we consider that the typical spectral line width might be about 1 , and if we assume that a ten percent absorption will be detectable, then this "artificial smog" will scatter about (1A/5000A)x10exp(-1) = 2x10exp(-5) of the total stellar flux.

Sagan and Shklovskii (1966) considered that if the central star has a typical solar flux of 4x10exp33 erg sec-1, it must scatter about 8x10exp28 erg sec-1 for the line to be detected. Thus, the ETC would need (8x10exp28)/10exp(-4) = 8x10exp32 atoms. The weight of the hydrogen atom (mH) is 1.66x10exp(-24) g, so the weight of an atom of atomic weight n is nxmH grams.

Drake proposed the used of Technetium (Tc) for this purpose. This element is not found on Earth and its presence is observed very weakly in the Sun, in part because it is short-lived. Tc's most stable form

decays radioactively within an average of twenty thousand years. Thus, for the case of Tc, we need to distribute some 1.3x10exp11 grams, or 1.3x10exp5 tons, of this element into the stellar spectrum. However, technetium lines have not been found in stars of solar spectral type, but rather only in peculiar ones known as S stars. We must know more than we do about both normal and peculiar stellar spectra before we can reasonably conclude that the presence of an unusual atom in an stellar spectrum is a sign of extraterrestrial intelligence.

Whitmire and Wright (1980) considered the possible observational consequences of galactic civilizations which utilize their local star as a repository for radioactive fissile waste material. If a relatively small fraction of the nuclear sources present in the crust of a terrestrial-type planet were processed via breeder reactors, the resulting stellar spectrum would be selectively modified over geological time periods, provided that the star has a sufficiently shallow outer convective zone. They have estimated that the abundance anomalies resulting from the slow neutron fission of plutonium-239 and uranium-233 could be duplicated (compared with the natural nucleosynthesis processes), if this process takes place.

Since there are no known natural nucleosynthesis mechanisms that can qualitatively duplicate the asymptotic fission abundances, the predicted observational characteristics (if observed) could not easily be interpreted as a natural phenomenon. They have suggested making a survey of A5-F2 stars for (1) an anomalous overabundance of the elements of praseodymium and neodymium, (2) the presence, at any level, of technetium or plutonium, and (3) an anomalously high ratio of barium to zirconium. Of course, if a candidate star is identified, a more detailed spectral analysis could be performed and compared with the predicted ratios.

Following the same kind of ideas, Philip Morrison discussed (Sullivan, 1964) converting one's sun into a signaling light by placing a cloud of particles in orbit around it. The cloud would cut enough light to make the sun appear to be flashing when seen from a distance, so long as the viewer was close to the plane of the cloud orbit. Particles about one micron in size, he thought, would be comparatively resistant to disruption. The mass of the cloud would be comparable to that of a comet covering an area of the sky five degrees wide, as seen from the sun. Every few months, the cloud would be shifted to constitute a slow form of signaling, the changes perhaps designed to represent algebraic equations.

Reeves (1985) speculated on the origin of mysterious stars called blue stragglers. This class of star was first identified by Sandage (1952). Since that time, no clear consensus upon their origins has emerged. This is not, however, due to a paucity of theoretical models being devised. Indeed, a wealth of explanations have been presented to explain the origins of this star class. The essential characteristic of the blue stragglers is that they lie on, or near, the Main

Sequence, but at surface temperatures and luminosities higher than those stars which define the cluster turnoff.

Reeves (1985) suggested the intervention of the inhabitants that depend on these stars for light and heat. According to Reeves, these inhabitants could have found a way of keeping the stellar cores well-mixed with hydrogen, thus delaying the Main Sequence turn-off and the ultimately destructive, red giant phase.

Beech (1990) made a more detailed analysis of Reeves' hypothesis and suggested an interesting list of mechanisms for mixing envelope material into the core of the star. Some of them are as follows:

o Creating a "hot spot" between the stellar core and surface through the detonation of a series of hydrogen bombs. This process may alternately be achieved by aiming "a powerful, extremely concentrated laser beam" at the stellar surface.

o Enhanced stellar rotation and/or enhanced magnetic fields. Abt (1985) suggested from his studies of blue stragglers that meridional mixing in rapidly rotating stars may enhance their Main Sequence lifetime.

If some of these processes can be achieved, the Main Sequence lifetime may be greatly extended by factors of ten or more. It is far too early to establish, however, whether all the blue stragglers are the result of astroengineering activities.

Editor's Note: References to this paper will be published in Part 2 in the January 1994 issue of the EJASA.

Related EJASA Articles -

"Does Extraterrestrial Life Exist?", by Angie Feazel - November 1989

"Suggestions for an Intragalactic Information Exchange System", by Lars W. Holm - November 1989

"Radio Astronomy: A Historical Perspective", by David J. Babulski - February 1990

"Getting Started in Amateur Radio Astronomy", by Jeffrey M. Lichtman - February 1990

"A Comparison of Optical and Radio Astronomy", by David J. Babulski - June 1990

"The Search for Extraterrestrial Intelligence (SETI) in the Optical Spectrum, Parts A-F", by Dr. Stuart A. Kingsley - January 1992

"History of the Ohio SETI Program", by Robert S. Dixon - June 1992

"New Ears on the Sky: The NASA SETI Microwave Observing Project", by Bob Arnold, the ARC, and JPL SETI Project - July 1992

"First International Conference on Optical SETI", by Dr. Stuart A. Kingsley - October 1992

"Conference Preview: The Search for Extraterrestrial Intelligence (SETI) in the Optical Spectrum", by Dr. Stuart A. Kingsley - January 1993

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508. ORBS$358.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-24 14:44:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-358.o.1993@ampr.org>
Source record: 28371
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-358.O
Orbital Elements 358.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX December 24, 1993
BID: $ORBS-358.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93329.34450477
Element set: 213
Inclination: 27.1217 deg
RA of node: 354.5434 deg
Eccentricity: 0.6014493
Arg of perigee: 132.9243 deg
Mean anomaly: 298.0909 deg
Mean motion: 2.06477387 rev/day
Decay rate: 9.0e-08 rev/day^2
Epoch rev: 7858
Checksum: 313

Satellite: UO-11
Catalog number: 14781
Epoch time: 93352.06493232
Element set: 619
Inclination: 97.7951 deg
RA of node: 10.1968 deg
Eccentricity: 0.0012338
Arg of perigee: 124.9246 deg
Mean anomaly: 235.3121 deg
Mean motion: 14.69103843 rev/day
Decay rate: 2.49e-06 rev/day^2
Epoch rev: 52371
Checksum: 297

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93353.78531718
Element set: 839
Inclination: 82.9275 deg
RA of node: 101.4555 deg
Eccentricity: 0.0012165
Arg of perigee: 156.0268 deg
```

Mean anomaly: 204.1456 deg
Mean motion: 13.72328016 rev/day
Decay rate: 3.9e-07 rev/day^2
Epoch rev: 32530
Checksum: 295

Satellite: AO-13
Catalog number: 19216
Epoch time: 93356.82690458
Element set: 850
Inclination: 57.9666 deg
RA of node: 277.5430 deg
Eccentricity: 0.7210696
Arg of perigee: 330.9913 deg
Mean anomaly: 3.3970 deg
Mean motion: 2.09727363 rev/day
Decay rate: -7.63e-06 rev/day^2
Epoch rev: 4231
Checksum: 328

Satellite: FO-20
Catalog number: 20480
Epoch time: 93355.44982285
Element set: 638
Inclination: 99.0168 deg
RA of node: 176.0166 deg
Eccentricity: 0.0541260
Arg of perigee: 22.2699 deg
Mean anomaly: 340.0980 deg
Mean motion: 12.83222967 rev/day
Decay rate: -1.7e-07 rev/day^2
Epoch rev: 18133
Checksum: 310

Satellite: AO-21
Catalog number: 21087
Epoch time: 93357.16575150
Element set: 399
Inclination: 82.9459 deg
RA of node: 272.9683 deg
Eccentricity: 0.0033939
Arg of perigee: 213.7252 deg
Mean anomaly: 146.1744 deg
Mean motion: 13.74530786 rev/day
Decay rate: 9.4e-07 rev/day^2
Epoch rev: 14540
Checksum: 331

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93353.88399174

Element set: 641
Inclination: 82.9202 deg
RA of node: 144.4175 deg
Eccentricity: 0.0028238
Arg of perigee: 247.3749 deg
Mean anomaly: 112.4421 deg
Mean motion: 13.74031650 rev/day
Decay rate: 2.1e-07 rev/day^2
Epoch rev: 14402
Checksum: 288

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

509. ORBS$358.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-24 14:46:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-358.d.1993@ampr.org>
Source record: 28369
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-358.D
Orbital Elements 358.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX December 24, 1993
BID: $ORBS-358.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93353.73078132
Element set: 940
Inclination: 98.6029 deg
RA of node: 75.8633 deg
Eccentricity: 0.0011465
Arg of perigee: 2.5266 deg
Mean anomaly: 357.5973 deg
Mean motion: 14.29811303 rev/day
Decay rate: 6.4e-07 rev/day^2
Epoch rev: 20394
Checksum: 302

Satellite: AO-16
Catalog number: 20439
Epoch time: 93353.72330553
Element set: 741
Inclination: 98.6110 deg
RA of node: 76.9082 deg
Eccentricity: 0.0011736
Arg of perigee: 2.7801 deg
Mean anomaly: 357.3445 deg
Mean motion: 14.29867859 rev/day
Decay rate: 6.6e-07 rev/day^2
Epoch rev: 20395
Checksum: 313

Satellite: DO-17
Catalog number: 20440
Epoch time: 93353.76501517
Element set: 722
Inclination: 98.6116 deg
RA of node: 77.2143 deg
Eccentricity: 0.0011897
Arg of perigee: 2.5935 deg
```

Mean anomaly: 357.5307 deg
Mean motion: 14.30005317 rev/day
Decay rate: 7.7e-07 rev/day^2
Epoch rev: 20397
Checksum: 289

Satellite: WO-18
Catalog number: 20441
Epoch time: 93353.73726563
Element set: 742
Inclination: 98.6108 deg
RA of node: 77.1992 deg
Eccentricity: 0.0012470
Arg of perigee: 1.9872 deg
Mean anomaly: 358.1359 deg
Mean motion: 14.29982522 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 20397
Checksum: 324

Satellite: LO-19
Catalog number: 20442
Epoch time: 93353.72731485
Element set: 740
Inclination: 98.6123 deg
RA of node: 77.4062 deg
Eccentricity: 0.0012815
Arg of perigee: 1.5633 deg
Mean anomaly: 358.5590 deg
Mean motion: 14.30075638 rev/day
Decay rate: 7.5e-07 rev/day^2
Epoch rev: 20398
Checksum: 300

Satellite: UO-22
Catalog number: 21575
Epoch time: 93353.75748489
Element set: 441
Inclination: 98.4535 deg
RA of node: 66.7225 deg
Eccentricity: 0.0008505
Arg of perigee: 101.5487 deg
Mean anomaly: 258.6654 deg
Mean motion: 14.36875041 rev/day
Decay rate: 1.09e-06 rev/day^2
Epoch rev: 12731
Checksum: 323

Satellite: KO-23
Catalog number: 22077
Epoch time: 93353.94580435

Element set: 337
Inclination: 66.0886 deg
RA of node: 295.2665 deg
Eccentricity: 0.0006949
Arg of perigee: 331.1179 deg
Mean anomaly: 28.9453 deg
Mean motion: 12.86282320 rev/day
Decay rate: -3.7e-07 rev/day^2
Epoch rev: 6373
Checksum: 325

Satellite: AO-27
Catalog number: 22825
Epoch time: 93353.74382815
Element set: 239
Inclination: 98.6733 deg
RA of node: 66.2045 deg
Eccentricity: 0.0009172
Arg of perigee: 18.4935 deg
Mean anomaly: 341.6577 deg
Mean motion: 14.27596448 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 1208
Checksum: 321

Satellite: IO-26
Catalog number: 22826
Epoch time: 93353.94801570
Element set: 240
Inclination: 98.6737 deg
RA of node: 66.4193 deg
Eccentricity: 0.0009857
Arg of perigee: 18.2897 deg
Mean anomaly: 341.8607 deg
Mean motion: 14.27698719 rev/day
Decay rate: 2.1e-07 rev/day^2
Epoch rev: 1211
Checksum: 326

Satellite: KO-25
Catalog number: 22830
Epoch time: 93353.71873553
Element set: 240
Inclination: 98.5706 deg
RA of node: 65.3408 deg
Eccentricity: 0.0011621
Arg of perigee: 348.1932 deg
Mean anomaly: 11.8974 deg
Mean motion: 14.28023309 rev/day
Decay rate: 6.0e-07 rev/day^2
Epoch rev: 1208

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Checksum: 282

/EX
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510. ORBS$358.WEATH.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-24 14:50:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-358.w.1993@ampr.org>
Source record: 28372
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-358.W
Orbital Elements 358.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX December 24, 1993
BID: $ORBS-358.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93354.09639046
Element set: 642
Inclination: 99.0778 deg
RA of node: 37.2630 deg
Eccentricity: 0.0015442
Arg of perigee: 8.0271 deg
Mean anomaly: 352.1146 deg
Mean motion: 14.13572305 rev/day
Decay rate: 1.13e-06 rev/day^2
Epoch rev: 46504
Checksum: 283

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93354.02187208
Element set: 540
Inclination: 98.5124 deg
RA of node: 3.4782 deg
Eccentricity: 0.0013795
Arg of perigee: 128.8764 deg
Mean anomaly: 231.3649 deg
Mean motion: 14.24851603 rev/day
Decay rate: 6.2e-07 rev/day^2
Epoch rev: 37709
Checksum: 314

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93353.67766328
Element set: 239
Inclination: 82.5445 deg
RA of node: 51.3880 deg
Eccentricity: 0.0016224
Arg of perigee: 329.8142 deg
```

Mean anomaly: 30.2076 deg
Mean motion: 13.84702544 rev/day
Decay rate: 9.3e-07 rev/day^2
Epoch rev: 29751
Checksum: 311

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93353.79260360
Element set: 240
Inclination: 82.5462 deg
RA of node: 90.6390 deg
Eccentricity: 0.0017018
Arg of perigee: 353.8935 deg
Mean anomaly: 6.1977 deg
Mean motion: 13.16962465 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 25964
Checksum: 312

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93354.12874457
Element set: 440
Inclination: 99.1549 deg
RA of node: 333.8243 deg
Eccentricity: 0.0011091
Arg of perigee: 278.6226 deg
Mean anomaly: 81.3688 deg
Mean motion: 14.12942396 rev/day
Decay rate: 1.06e-06 rev/day^2
Epoch rev: 26993
Checksum: 320

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93353.97710199
Element set: 240
Inclination: 82.5197 deg
RA of node: 286.7902 deg
Eccentricity: 0.0015442
Arg of perigee: 14.0276 deg
Mean anomaly: 346.1306 deg
Mean motion: 13.84351320 rev/day
Decay rate: 1.8e-07 rev/day^2
Epoch rev: 24289
Checksum: 307

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93353.97717306

Element set: 953
Inclination: 82.5531 deg
RA of node: 33.8892 deg
Eccentricity: 0.0007368
Arg of perigee: 22.7503 deg
Mean anomaly: 337.3943 deg
Mean motion: 13.04424233 rev/day
Decay rate: 4.4e-07 rev/day^2
Epoch rev: 19953
Checksum: 300

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93353.96446215
Element set: 740
Inclination: 82.5448 deg
RA of node: 350.8248 deg
Eccentricity: 0.0014781
Arg of perigee: 293.8237 deg
Mean anomaly: 66.1375 deg
Mean motion: 13.84184845 rev/day
Decay rate: 2.3e-07 rev/day^2
Epoch rev: 17582
Checksum: 327

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93360.47055517
Element set: 851
Inclination: 98.8535 deg
RA of node: 21.0647 deg
Eccentricity: 0.0016083
Arg of perigee: 128.7875 deg
Mean anomaly: 238.6680 deg
Mean motion: 14.01407715 rev/day
Decay rate: 4.17e-06 rev/day^2
Epoch rev: 16951
Checksum: 318

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93353.89061238
Element set: 739
Inclination: 82.5251 deg
RA of node: 288.6280 deg
Eccentricity: 0.0012360
Arg of perigee: 185.9409 deg
Mean anomaly: 174.1606 deg
Mean motion: 13.83566699 rev/day
Decay rate: 4.1e-07 rev/day^2
Epoch rev: 16296

Checksum: 327

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93353.88294834
Element set: 646
Inclination: 82.5423 deg
RA of node: 296.3537 deg
Eccentricity: 0.0012666
Arg of perigee: 279.5525 deg
Mean anomaly: 80.4165 deg
Mean motion: 13.16458564 rev/day
Decay rate: 5.0e-07 rev/day^2
Epoch rev: 12776
Checksum: 323

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93354.09713546
Element set: 847
Inclination: 98.6387 deg
RA of node: 20.6638 deg
Eccentricity: 0.0013805
Arg of perigee: 38.8062 deg
Mean anomaly: 321.4103 deg
Mean motion: 14.22347172 rev/day
Decay rate: 1.51e-06 rev/day^2
Epoch rev: 13507
Checksum: 285

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93353.74411036
Element set: 643
Inclination: 82.5572 deg
RA of node: 243.4589 deg
Eccentricity: 0.0012742
Arg of perigee: 289.6651 deg
Mean anomaly: 70.3097 deg
Mean motion: 13.16826431 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 11284
Checksum: 300

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93353.94664817
Element set: 240
Inclination: 82.5475 deg
RA of node: 348.4754 deg
Eccentricity: 0.0023209

```
Arg of perigee: 11.8803 deg
Mean anomaly: 348.2904 deg
Mean motion: 13.82995041 rev/day
Decay rate: 7.7e-07 rev/day^2
Epoch rev: 1531
Checksum: 310

/EX
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511. ORBS$358.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-24 14:51:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-358.m.1993@ampr.org>
Source record: 28368
Cross-posted to: rec.radio.amateur.space,rec.radio.info

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SB KEPS @ AMSAT $ORBS-358.M
Orbital Elements 358.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX December 24, 1993
BID: $ORBS-358.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93356.89342327
Element set: 62
Inclination: 51.6187 deg
RA of node: 351.4352 deg
Eccentricity: 0.0005780
Arg of perigee: 118.8381 deg
Mean anomaly: 241.3181 deg
Mean motion: 15.59225375 rev/day
Decay rate: 1.2770e-04 rev/day^2
Epoch rev: 44854
Checksum: 308

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93357.18124168
Element set: 411
Inclination: 28.4713 deg
RA of node: 286.3937 deg
Eccentricity: 0.0005954
Arg of perigee: 49.1134 deg
Mean anomaly: 310.9966 deg
Mean motion: 14.90390440 rev/day
Decay rate: 7.63e-06 rev/day^2
Epoch rev: 310
Checksum: 284

Satellite: GRO
Catalog number: 21225
Epoch time: 93356.46954065
Element set: 38
Inclination: 28.4628 deg
RA of node: 17.8570 deg
Eccentricity: 0.0003464
Arg of perigee: 25.0031 deg
```

```
Mean anomaly: 335.0734 deg
Mean motion: 15.39616634 rev/day
Decay rate: 3.496e-05 rev/day^2
Epoch rev: 2966
Checksum: 296

Satellite: UARS
Catalog number: 21701
Epoch time: 93353.94360770
Element set: 442
Inclination: 56.9809 deg
RA of node: 157.2740 deg
Eccentricity: 0.0005834
Arg of perigee: 103.0283 deg
Mean anomaly: 257.1402 deg
Mean motion: 14.96302505 rev/day
Decay rate: 2.033e-05 rev/day^2
Epoch rev: 12410
Checksum: 260

Satellite: POSAT
Catalog number: 22829
Epoch time: 93353.79061720
Element set: 232
Inclination: 98.6671 deg
RA of node: 66.2636 deg
Eccentricity: 0.0010487
Arg of perigee: 5.2318 deg
Mean anomaly: 354.8962 deg
Mean motion: 14.27991712 rev/day
Decay rate: 9.5e-07 rev/day^2
Epoch rev: 1209
Checksum: 306

/EX
```

512. ORBS$358.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-24 14:54:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-358.n.1993@ampr.org>
Source record: 28370
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-358.N
2Line Orbital Elements 358.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX December 24, 1993
BID: $ORBS-358.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 78587
UO-11
1 14781U 84021B 93352.06493232 .00000249 00000-0 50253-4 0 6190
2 14781 97.7951 10.1968 0012338 124.9246 235.3121 14.69103843523715
RS-10/11
1 18129U 87054A 93353.78531718 .00000039 00000-0 25711-4 0 8393
2 18129 82.9275 101.4555 0012165 156.0268 204.1456 13.72328016325308
AO-13
1 19216U 88051B 93356.82690458 -.00000763 00000-0 10000-4 0 8507
2 19216 57.9666 277.5430 7210696 330.9913 3.3970 2.09727363 42318
FO-20
1 20480U 90013C 93355.44982285 -.00000017 00000-0 32207-4 0 6381
2 20480 99.0168 176.0166 0541260 22.2699 340.0980 12.83222967181336
AO-21
1 21087U 91006A 93357.16575150 .00000094 00000-0 82657-4 0 3990
2 21087 82.9459 272.9683 0033939 213.7252 146.1744 13.74530786145408
RS-12/13
1 21089U 91007A 93353.88399174 .00000021 00000-0 60794-5 0 6417
2 21089 82.9202 144.4175 0028238 247.3749 112.4421 13.74031650144026
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
UO-14
1 20437U 90005B 93353.73078132 .00000064 00000-0 42114-4 0 9406
2 20437 98.6029 75.8633 0011465 2.5266 357.5973 14.29811303203941
AO-16
1 20439U 90005D 93353.72330553 .00000066 00000-0 42857-4 0 7410
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2 20439 98.6110 76.9082 0011736 2.7801 357.3445 14.29867859203952
DO-17
1 20440U 90 5 E 93353.76501517 .00000077 00000-0 37666-4 0 7229
2 20440 98.6116 77.2143 0011897 2.5935 357.5307 14.30005317203972
WO-18
1 20441U 90005F 93353.73726563 .00000047 00000-0 35071-4 0 7424
2 20441 98.6108 77.1992 0012470 1.9872 358.1359 14.29982522203970
LO-19
1 20442U 90005G 93353.72731485 .00000075 00000-0 45923-4 0 7409
2 20442 98.6123 77.4062 0012815 1.5633 358.5590 14.30075638203988
UO-22
1 21575U 91050B 93353.75748489 .00000109 00000-0 51387-4 0 4410
2 21575 98.4535 66.7225 0008505 101.5487 258.6654 14.36875041127317
KO-23
1 22077U 92052B 93353.94580435 -.00000037 00000-0 10000-3 0 3378
2 22077 66.0886 295.2665 0006949 331.1179 28.9453 12.86282320 63736
AO-27
1 22825U 93061C 93353.74382815 .00000041 00000-0 34677-4 0 2392
2 22825 98.6733 66.2045 0009172 18.4935 341.6577 14.27596448 12083
IO-26
1 22826U 93061D 93353.94801570 .00000021 00000-0 26616-4 0 2403
2 22826 98.6737 66.4193 0009857 18.2897 341.8607 14.27698719 12113
KO-25
1 22830U 93061H 93353.71873553 .00000060 00000-0 41620-4 0 2408
2 22830 98.5706 65.3408 0011621 348.1932 11.8974 14.28023309 12082
NOAA-9
1 15427U 84123A 93354.09639046 .00000113 00000-0 84054-4 0 6423
2 15427 99.0778 37.2630 0015442 8.0271 352.1146 14.13572305465048
NOAA-10
1 16969U 86073A 93354.02187208 .00000062 00000-0 44748-4 0 5408
2 16969 98.5124 3.4782 0013795 128.8764 231.3649 14.24851603377095
MET-2/17
1 18820U 88005A 93353.67766328 .00000093 00000-0 69498-4 0 2397
2 18820 82.5445 51.3880 0016224 329.8142 30.2076 13.84702544297518
MET-3/2
1 19336U 88064A 93353.79260360 .00000051 00000-0 10000-3 0 2403
2 19336 82.5462 90.6390 0017018 353.8935 6.1977 13.16962465259640
NOAA-11
1 19531U 88089A 93354.12874457 .00000106 00000-0 81723-4 0 4407
2 19531 99.1549 333.8243 0011091 278.6226 81.3688 14.12942396269933
MET-2/18
1 19851U 89018A 93353.97710199 .00000018 00000-0 28327-5 0 2401
2 19851 82.5197 286.7902 0015442 14.0276 346.1306 13.84351320242896
MET-3/3
1 20305U 89086A 93353.97717306 .00000044 00000-0 10000-3 0 9536
2 20305 82.5531 33.8892 0007368 22.7503 337.3943 13.04424233199537
MET-2/19
1 20670U 90057A 93353.96446215 .00000023 00000-0 79036-5 0 7405
2 20670 82.5448 350.8248 0014781 293.8237 66.1375 13.84184845175820
FY-1/2
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1 20788U 90081A 93360.47055517 .00000417 00000-0 30433-3 0 8513
2 20788 98.8535 21.0647 0016083 128.7875 238.6680 14.01407715169516
MET-2/20
1 20826U 90086A 93353.89061238 .00000041 00000-0 23472-4 0 7390
2 20826 82.5251 288.6280 0012360 185.9409 174.1606 13.83566699162960
MET-3/4
1 21232U 91030A 93353.88294834 .00000050 00000-0 10000-3 0 6460
2 21232 82.5423 296.3537 0012666 279.5525 80.4165 13.16458564127767
NOAA-12
1 21263U 91032A 93354.09713546 .00000151 00000-0 87438-4 0 8471
2 21263 98.6387 20.6638 0013805 38.8062 321.4103 14.22347172135079
MET-3/5
1 21655U 91056A 93353.74411036 .00000051 00000-0 10000-3 0 6435
2 21655 82.5572 243.4589 0012742 289.6651 70.3097 13.16826431112845
MET-2/21
1 22782U 93055A 93353.94664817 .00000077 00000-0 56922-4 0 2402
2 22782 82.5475 348.4754 0023209 11.8803 348.2904 13.82995041 15318
MIR
1 16609U 86017A 93356.89342327 .00012770 00000-0 16562-3 0 629
2 16609 51.6187 351.4352 0005780 118.8381 241.3181 15.59225375448544
HUBBLE
1 20580U 90037B 93357.18124168 .00000763 00000-0 61401-4 0 4113
2 20580 28.4713 286.3937 0005954 49.1134 310.9966 14.90390440 3107
GRO
1 21225U 91027B 93356.46954065 .00003496 00000-0 79758-4 0 382
2 21225 28.4628 17.8570 0003464 25.0031 335.0734 15.39616634 29662
UARS
1 21701U 91063B 93353.94360770 .00002033 00000-0 19944-3 0 4420
2 21701 56.9809 157.2740 0005834 103.0283 257.1402 14.96302505124107
POSAT
1 22829U 93061G 93353.79061720 .00000095 00000-0 56185-4 0 2320
2 22829 98.6671 66.2636 0010487 5.2318 354.8962 14.27991712 12092
/EX
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513. Two-Line Orbital Element Sets (TLE315)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-25 22:19:57 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.756857997@afit.af.mil>
Source record: 28373
Cross-posted to: rec.radio.amateur.space,rec.radio.info

The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

```
- Current Two-Line Element Sets #315 -
Alouette 1
1 00424U 62049 93353.91432629 .00000048 00000-0 46558-4 0 9422
2 00424 80.4672 101.8833 0023072 214.3492 145.6152 13.67791263557895
ATS 3
1 03029U 67111A 93356.48678810 -.00000106 00000-0 10000-3 0 1408
2 03029 14.5285 9.2670 0011758 260.8095 250.8341 1.00272750 95660
Cosmos 398
1 04966U 71016A 93357.13699782 .00096073 60380-5 22689-3 0 8831
2 04966 51.4661 280.8944 1197523 217.4885 133.6131 13.48030152748653
Starlette
1 07646U 75010A 93353.84471655 -.00000129 00000-0 12670-4 0 7383
2 07646 49.8190 141.0601 0206091 104.0074 258.3825 13.82185002953047
LAGEOS
1 08820U 76039A 93353.65188007 -.00000009 00000-0 10000-3 0 9423
2 08820 109.8526 74.0998 0044037 323.4084 36.3666 6.38664523155688
ETS-2
1 09852U 77014A 93348.29081642 -.00000090 00000-0 10000-3 0 9109
2 09852 11.8209 43.7338 0001406 88.5576 223.9071 1.00024368 8809
GOES 2
1 10061U 77048A 93353.99496508 .00000079 00000-0 10000-3 0 2529
2 10061 10.8578 47.9166 0002708 14.7285 248.2906 1.00279052 5312
IUE
1 10637U 78012A 93355.26346615 -.00000245 00000-0 10000-3 0 9472
2 10637 34.3310 97.7855 1305585 30.5958 5.6695 1.00261334 10946
GPS BI-01
1 10684U 78020A 93331.28584705 -.00000018 00000-0 10000-3 0 2092
2 10684 64.5359 51.5287 0064487 161.9483 198.3465 1.98079803100925
GPS BI-02
1 10893U 78047A 93346.27511031 -.00000022 00000-0 10000-3 0 48
```

```
2 10893 63.6085 290.4497 0215658 13.6969 346.8575 2.01627249114307
GOES 3
1 10953U 78062A 93353.76859961 .00000074 00000-0 10000-3 0 2443
2 10953 9.7834 50.7015 0005434 126.7779 13.1392 1.00257729 9926
SeaSat 1
1 10967U 78064A 93353.91281889 .00000007 00000-0 47060-4 0 2415
2 10967 108.0000 91.2014 0002770 243.3799 116.7059 14.37902204810598
GPS BI-03
1 11054U 78093A 93354.95777656 -.00000068 00000-0 10000-3 0 1399
2 11054 63.3413 287.0078 0043616 176.6149 183.4333 1.93505265111069
Nimbus 7
1 11080U 78098A 93353.70026926 -.00000002 00000-0 36357-4 0 3442
2 11080 99.0752 238.7810 0008311 255.2883 104.7351 13.83726259765251
GPS BI-04
1 11141U 78112A 93356.58051838 -.00000057 00000-0 00000+0 0 8396
2 11141 64.5630 51.7186 0048094 25.5031 334.7917 1.92894761 374
GPS BI-05
1 11690U 80011A 93356.40134217 -.00000056 00000-0 10000-3 0 7360
2 11690 64.8959 52.6158 0142261 198.4936 161.1194 2.00553055115996
GPS BI-06
1 11783U 80032A 93357.03792086 -.00000063 00000-0 10000-3 0 9382
2 11783 62.7640 284.1405 0206077 29.1448 332.0221 2.03456600100371
GOES 5
1 12472U 81049A 93350.58137649 .00000096 00000-0 10000-3 0 7101
2 12472 6.4500 60.1423 0004134 7.4600 87.4401 1.00248254 3933
Cosmos 1383
1 13301U 82066A 93353.77083833 .00000020 00000-0 64964-5 0 2418
2 13301 82.9340 81.3140 0026265 227.6006 132.2924 13.68047736572896
LandSat 4
1 13367U 82072A 93357.20033997 .00000040 00000-0 18944-4 0 4145
2 13367 98.2065 53.6842 0008263 79.6955 280.5174 14.57114046608431
IRAS
1 13777U 83004A 93353.92876720 -.00000239 00000-0 -13509-3 0 5469
2 13777 98.9705 183.5644 0012721 90.3114 269.9510 13.99188151226072
Cosmos 1447
1 13916U 83021A 93353.87624521 .00000066 00000-0 53507-4 0 3419
2 13916 82.9457 144.3153 0037923 167.1089 193.1046 13.74300770538703
TDRS 1
1 13969U 83026B 93357.26801716 -.00000227 00000-0 10000-3 0 2523
2 13969 7.3475 52.9339 0017045 108.9534 181.8090 0.99853332 92
GOES 6
1 14050U 83041A 93353.15907024 -.00000219 00000-0 10000-3 0 1424
2 14050 5.2374 63.0371 0002911 301.0762 58.9367 1.00236885 10984
OSCAR 10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 50611
LandSat 5
1 14780U 84021A 93355.65968585 .00000100 00000-0 32170-4 0 03
2 14780 98.1905 53.7293 0005768 88.3349 271.8510 14.57122864521624
UoSat 2
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1 14781U 84021B 93352.06493232 .00000249 00000-0 50253-4 0 6190
2 14781 97.7951 10.1968 0012338 124.9246 235.3121 14.69103843523715
GPS BI-09
1 15039U 84059A 93353.73699627 -.00000064 00000-0 10000-3 0 1465
2 15039 63.8616 46.6711 0056304 218.0983 141.5617 2.00560877 69740
Cosmos 1574
1 15055U 84062A 93353.58829836 .00000063 00000-0 51776-4 0 5410
2 15055 82.9557 197.4826 0028283 359.4649 0.6472 13.73597725475974
GPS BI-10
1 15271U 84097A 93353.16755792 -.00000059 00000-0 10000-3 0 7479
2 15271 62.4595 284.1988 0141552 346.3155 13.3218 2.00575946 66844
Cosmos 1602
1 15331U 84105A 93340.77727466 .00000908 00000-0 10526-3 0 2386
2 15331 82.5358 257.8483 0021860 114.7775 245.5735 14.84209942495970
NOAA 9
1 15427U 84123A 93354.09639046 .00000113 00000-0 84054-4 0 6423
2 15427 99.0778 37.2630 0015442 8.0271 352.1146 14.13572305465048
GPS BI-11
1 16129U 85093A 93353.40462664 -.00000061 00000-0 10000-3 0 5436
2 16129 64.6105 48.7289 0131180 141.7491 219.2486 2.00563878 6559
Mir
1 16609U 86017A 93356.89342327 .00012770 00000-0 16562-3 0 629
2 16609 51.6187 351.4352 0005780 118.8381 241.3181 15.59225375448544
SPOT 1
1 16613U 86019A 93357.20191494 .00000089 00000-0 62356-4 0 6088
2 16613 98.7112 68.8311 0000970 62.9133 297.2143 14.20028687 91583
Cosmos 1766
1 16881U 86055A 93353.92862329 .00000518 00000-0 60209-4 0 1393
2 16881 82.5188 303.6295 0021302 95.6538 264.7107 14.83255351398880
EGP
1 16908U 86061A 93353.89776046 -.00000083 00000-0 10000-3 0 8406
2 16908 50.0129 275.6058 0011160 216.4462 143.5614 12.44408622334445
NOAA 10
1 16969U 86073A 93354.02187208 .00000062 00000-0 44748-4 0 5408
2 16969 98.5124 3.4782 0013795 128.8764 231.3649 14.24851603377095
MOS-1
1 17527U 87018A 93354.30751519 .00000124 00000-0 12493-3 0 03
2 17527 99.0579 61.5751 0001160 56.4965 303.6250 13.94896088348001
GOES 7
1 17561U 87022A 93357.23990600 -.00000028 00000-0 10000-3 0 6560
2 17561 1.1658 77.8675 0002973 323.6652 24.1682 1.00270144 8203
Kvant-1
1 17845U 87030A 93355.99613199 .00017726 00000-0 22739-3 0 6935
2 17845 51.6185 355.9472 0005924 113.7251 246.4360 15.59211339448479
DMSP B5D2-3
1 18123U 87053A 93354.01437322 .00000044 00000-0 45213-4 0 1656
2 18123 98.7886 183.3243 0014190 335.0955 24.9531 14.15324336335661
RS-10/11
1 18129U 87054A 93353.78531718 .00000039 00000-0 25711-4 0 8393
2 18129 82.9275 101.4555 0012165 156.0268 204.1456 13.72328016325308
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Meteor 2-16
1 18312U 87068A 93353.94185500 .00000062 00000-0 42415-4 0 2406
2 18312 82.5543 354.0190 0010850 255.7510 104.2446 13.84016830320263
Meteor 2-17
1 18820U 88005A 93353.67766328 .00000093 00000-0 69498-4 0 2397
2 18820 82.5445 51.3880 0016224 329.8142 30.2076 13.84702544297518
DMSP B5D2-4
1 18822U 88006A 93354.10515213 .00000132 00000-0 77410-4 0 2706
2 18822 98.4631 211.2527 0006669 139.4752 220.6923 14.22910016305055
Glonass 34
1 19163U 88043A 93354.63209343 .00000031 00000-0 10000-3 0 8411
2 19163 64.9933 116.4401 0007116 157.3333 202.6846 2.13101717 42853
Glonass 36
1 19165U 88043C 93356.56492283 .00000016 00000-0 10000-3 0 2376
2 19165 64.9827 116.3476 0002791 3.9542 356.0394 2.13101438 43516
METEOSAT 3
1 19215U 88051A 93354.00000000 -.00000243 00000-0 10000-3 0 8447
2 19215 1.3469 72.8235 0004520 233.2521 67.4008 1.00252052 8111
AO-13
1 19216U 88051B 93356.82690458 -.00000763 00000-0 10000-4 0 8507
2 19216 57.9666 277.5430 7210696 330.9913 3.3970 2.09727363 10818
OKEAN 1
1 19274U 88056A 93353.62085570 .00000495 00000-0 59301-4 0 8399
2 19274 82.5158 43.6471 0018266 239.9381 120.0018 14.82040704294486
Meteor 3-2
1 19336U 88064A 93353.79260360 .00000051 00000-0 10000-3 0 2403
2 19336 82.5462 90.6390 0017018 353.8935 6.1977 13.16962465259640
Glonass 39
1 19503U 88085C 93346.26596435 -.00000014 00000-0 10000-3 0 1130
2 19503 65.7464 355.6230 0006382 176.6085 183.4257 2.13102105 40782
NOAA 11
1 19531U 88089A 93354.12874457 .00000106 00000-0 81723-4 0 4407
2 19531 99.1549 333.8243 0011091 278.6226 81.3688 14.12942396269933
TDRS 2
1 19548U 88091B 93353.39270124 -.00000278 00000-0 10000-3 0 8490
2 19548 0.6228 79.2129 0002975 177.0715 270.7606 1.00260590 6409
Glonass 40
1 19749U 89001A 93356.62957407 .00000015 00000-0 10000-3 0 3482
2 19749 64.9514 115.9660 0006045 264.5498 95.3682 2.13101246 38512
Glonass 41
1 19750U 89001B 93350.11683020 .00000021 00000-0 10000-3 0 2362
2 19750 64.9587 116.2034 0014751 175.1025 185.0829 2.13102012 38397
GPS BII-01
1 19802U 89013A 93355.23638582 .00000075 00000-0 10000-3 0 8459
2 19802 55.0714 146.7649 0035613 173.7998 186.2395 2.00570299 35481
Akebono
1 19822U 89016A 93353.87686773 .00018240 00000-0 10979-2 0 1693
2 19822 75.0906 283.3484 3839309 62.0062 331.5613 7.73497865 95376
Meteor 2-18
1 19851U 89018A 93353.97710199 .00000018 00000-0 28327-5 0 2401
```

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2 19851 82.5197 286.7902 0015442 14.0276 346.1306 13.84351320242896
MOP-1
1 19876U 89020B 93355.11597499 .00000000 00000-0 10000-3 0 7442
2 19876 0.1351 354.2889 0001025 329.8204 166.9952 1.00264033 5291
TDRS 3
1 19883U 89021B 93356.51596298 -.00000251 00000-0 00000+0 0 8504
2 19883 0.0645 101.2451 0001156 66.8654 67.6957 1.00268880 87691
GPS BII-02
1 20061U 89044A 93354.08237637 -.00000082 00000-0 10000-3 0 8482
2 20061 54.7381 323.7552 0125718 206.1846 153.1844 2.00566152 33208
Nadezhda 1
1 20103U 89050A 93353.70138828 .00000040 00000-0 26354-4 0 9424
2 20103 82.9589 60.1295 0039152 69.5867 290.9487 13.73829995223667
GPS BII-03
1 20185U 89064A 93356.41412316 .00000074 00000-0 10000-3 0 8524
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2 20217 0.1498 68.1478 0000202 197.7786 62.9610 1.00272200 16307
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2 20302 53.6808 264.1637 0005839 318.1343 41.8776 2.00562326 30604
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2 22925 47.3554 267.3194 7220229 7.8209 359.0208 2.32582627 309
1993072F
1 22926U 93072F 93354.82082401 .00003811 00000-0 12544-2 0 274
2 22926 47.2995 266.3427 7238298 8.7979 359.0201 2.33122513 167
TELSTAR 401
1 22927U 93077A 93354.06586493 -.00000117 00000-0 00000+0 0 320
2 22927 3.7932 271.3636 2464869 179.8740 180.6351 1.39369830 41
1993077B
1 22928U 93077B 93351.59999999 .00072669 32342-6 45188-2 0 32
2 22928 23.9120 275.9230 7302179 179.4240 198.9330 2.28571212 09
1993078A
1 22930U 93078A 93355.89999999 -.00000116 00000-0 -14121+0 0 268
2 22930 0.4820 291.1100 1647774 172.4540 196.9020 1.24516482 72
1993078B
1 22931U 93078B 93354.95387592 .00040426 00000-0 58007-2 0 254
2 22931 3.9207 284.5028 7315252 180.0030 178.2042 2.25409343 80
1993078C
1 22932U 93078C 93354.51861564 .00161637 -56762-7 66014-2 0 27
2 22932 4.3507 288.0690 7341888 176.3802 140.4612 2.24235755 78
1993078D
1 22933U 93078D 93354.51861564 .00047050 00000-0 66014-2 0 240
2 22933 3.9603 284.3685 7319441 180.0427 180.2633 2.24933493 78
1993079A
1 22949U 93079A 93356.91060231 -.00001027 00000-0 10000-3 0 22
2 22949 62.8214 350.7057 7396674 280.2740 10.9489 2.04842981 24
1993079B
1 22950U 93079B 93357.11944156 .00072539 79630-5 10103-3 0 34
2 22950 62.7934 349.8985 0129537 135.8817 347.0651 15.91679079 41
1993079C
1 22951U 93079C 93357.09911073 .00897574 78494-5 74473-3 0 24
2 22951 62.7968 349.9578 0184065 123.7900 238.0877 15.87150882 55
1993079D
1 22952U 93079D 93356.91054721 -.00000687 00000-0 10000-3 0 13
2 22952 62.9044 350.8792 7392111 280.0369 10.9676 2.06065290 13
```

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Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

514. ANS-359 BULLETINS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-25 22:30:22 UTC
From: Dave Cowdin <cowdin@pogo.den.mmc.com>
Message-ID: <$ans-359.01.1993@ampr.org>
Source record: 28374
Cross-posted to: rec.radio.amateur.space,rec.radio.info

SB SAT @ AMSAT $ANS-359.01
PHASE-3D FREQUENCIES

HR AMSAT NEWS SERVICE BULLETIN 359.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.01

The Phase-3D Transponder Frequencies Are Solidified

During the 3rd Payload Engineering meeting in Garching (near Munchen) the
following frequencies are determined for the P-3D International Satellite:

1. 21.210 MHz - 21.250 MHz uplink only (HF band)
Mode K

2. 29.330 MHz CAM (Compatible Amplitude Modulation)
Downlink only. (no transponder)
Spare Frequencies: 29.310, 29.320, 29.340, and 29.350 MHz
Mode A

3. 145.805 MHz - 145.995 MHz Uplink and Downlink: Mode V

4. 435.200 - 435.700 MHz Uplink 1
436.000 - 436.500 MHz Uplink 2
435.300 - 435.700 MHz Downlink
Mode U

5. 1268.5 - 1269.0 MHz Uplink 1
1269.0 - 1269.5 MHz Uplink 2
Mode L

6. 2400.5 - 2400.9 MHz Downlink
2400.1 - 2400.5 MHz Uplink
Mode S

7. 5840 MHz center frequency channel 25 kHz wide
Downlink only
Mode C

8. 10451.0 - 10451.5 MHz Downlink
Mode X

9. 24048 MHz downlink channel 25 kHz wide
Mode Ka

Each frequency passband is 500 KHz wide on the uplink and 400 kHz wide on the downlink except the Mode V is divided in an analog segment and a digital segment. The digital segment is in the lower frequency part of the band, the analog segment is in the upper frequency part of the band. The uplink segments are of equal width for both analog and digital modes. The down-link segment for digital modes is 150 kHz wide analog modes downlink is 250 KHz wide. The exact position of the beacons will be determined as soon as all relevant information is available.

These frequencies are FINAL and can only be changed for VERY good reasons.

Note that with the P-3D, the mode designations are changed according to Dick Janson WD4FAB designations:

Old Mode B = Mode UV
Old Mode J = Mode VU

To avoid confusion especially for newcomers, it is recommended that the new tranponder mode designations be used for all satellites.

[The AMSAT News Service (ANS) would like to thank Freddy de Guchteneire (ON6UG), IARU Satellite Coordinator, for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-359.02
AO-21 GOES MULTIMEDIA!

HR AMSAT NEWS SERVICE BULLETIN 359.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.02

RUDAK/AO-21 Goes Multimedia!

The RUDAK group of AMSAT-DL achieved another milestone with the development of more sophisticated software for the OSCAR-21/RUDAK satellite.

Although some key members are already very busy with P-3D activities, much time has been invested to implement new and attractive modes on AO-21.

Beside the Voice Broadcast which was successfully used throughout the last year with several greeting messages in different languages, RUDAK is now capable to transmit picture files in WEFAX compatible format. Unfortunate-ly there is no CCD camera onboard AO-21, so the pictures have to be up-loaded first by the AO-21 command station. But not only is RUDAK now capable of transmiting FAX pictures, the pictures themselves are uploaded and stored in JPEG format! They are also converted online by the RTX-2000 RISC processor from JPEG into WEFAX during transmission, so not alot of memory is needed.

JPEG compression gives an enormous reduction in file size compared to GIF picture format, without to much quality losses. This saves a lot of space in the 1MB ramdisk and will also speed-up the upload time drastically.

RUDAK is also capable to hold several picture and voice broadcast files in the ramdisk at the same time. They can be transmitted on a schedule mixed with FM-Mode and 1200 baud AX.25 Telemetry.

The "Multimedia" satellite premiere will be activated for the first time on December 24 and some special season greeting in voice and picture will be transmitted.

Stay tuned to AMSAT OSCAR-21 for some more surprises!

The RUDAK downlink mid-frequency is 145.987 MHz, Uplink for FM-Mode is 435.014 MHz. The WEFAX format is like METEOSAT WEFAX Specification (MGCS): FM, 2400 Hz Subcarrier frequency with double sideband AM modulation, 300 Hz start signal for 3 seconds, 450 Hz stop signal for 5 seconds, 800 x 800 Pixel Image format with 256 grey levels, 4 Lines/sec.

MERRY CHRISTMAS and a HAPPY NEW YEAR
AMSAT-DL, Germany and AMSAT-U, Russia

/EX
SB SAT @ AMSAT $ANS-359.03
SKN IS COMING!

HR AMSAT NEWS SERVICE BULLETIN 359.02 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.03

YOU'RE INVITED TO THE 22ND ANNUAL "STRAIGHT KEY NIGHT ON OSCAR"

As you know, ARRL has for many years sponsored Straight Key Night (SKN) on New Year's Eve and New Year's Day; it is expected to do so again in 1994.

On New Year's Eve, 1972 (January 1, 1973 UTC), a few of us from the AMSAT 75-meter Net decided that we would try to combine the best of the old and the new in Amateur Radio by operating in Straight Key Night on what was then the brand-new communications satellite, AMSAT-OSCAR 6. Since then, proud "brasspounders" have kept the tradition going by operating CW on OSCAR using straight keys for at least a little while on every New Year's Day (UTC) when there's been an OSCAR to work.

You're most cordially invited to join in the 22nd annual celebration. It's entirely informal and unofficial; there are no rules, no scoring and no need to send in a log. Just call CQ SKN in the CW passband segment of any OSCAR satellite between 00:00 and 23:59 UTC on January 1, 1994, or answer a CQ SKN call from another station. This year, we're changing things a little: we'll also count QSOs made via the oldest, largest and most reliable communications satellite, OSCAR Zero, otherwise known as the moon. AMSAT didn't build it, but we can adopt it! Of course, all SKN operating must be done with a straight hand key.

Just as in the ARRL HF version of this event, we're conducting a search for the OSCAR SKN operator with the "best fist." Please send in a nomination of someone you worked; we'll announce the winner or winners via packet bulletin. Last year's winners were KB6A, W6HDO and W8JAQ.

Nominations may be sent to Ray Soifer via packet to W2RS @ WA2SNA.NJ. USA. NA, from Europe to W2RS @ GB7HSN.#32.GBR.EU, via Internet to w2rs@amsat.org, or by mail via his Callbook address.

[The AMSAT News Service (ANS) wold like to thank Ray Soifer (W2RS) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-359.04
W3XO & AO-21 SEND XMAS GREETINGS

HR AMSAT NEWS SERVICE BULLETIN 359.04 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.04

AO-21 Sends Chrismas Greetings To All Radio Amateurs!

"Surprise is hardly the word for it", says AMSAT-NA President Bill Tynan (W3XO). Bill caught an AO-21 pass Thursday evening immediately after reading DB2OS's message about the Holiday activity on this versatile satellite. He was pleased, of course, to hear the Christmas carol, "Silent Night", coming from his speaker while tuned to AO-21's 145.983 FM downlink.

His first thought, probably like that of many others, on hearing any form of music on amateur frequencies was; "They can't do that!" Upon further reflection, he realized that, the prohibition against the transmission of music on Amateur Radio is a U.S. rule, not necessarily reflected by every other country. Since AO-21 was licensed by the Soviet Union and now by Russia, sending this form of Holiday greeting is subject to their rules.

So, Bill advises, just listen and enjoy. Please do not complain, about music on the ham bands to the FCC, the ARRL or AMSAT. But also, just because you heard it on an amateur frequency, don't relay it to you your friends via Amateur Radio.

On behalf of the organization, AMSAT-NA President Bill Tynan (W3XO) wishes satellite enthusiasts and all hams everywhere, season's greetings and the best of DX and good fortune in 1994.

/EX
SB SAT @ AMSAT $ANS-359.05
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 359.05 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.05

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO,

OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date UTC Mode Phs NCS Alt NCS

3-Jan-94 0200 B 160 WA5ZIB N7NQM

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate NCS do not call on frequency, any participant is invited to act as the NCS.

****

Slow Scan Television on AO-13

SSTV sessions will be held on immediately after the OPS Nets a downlink on a Mode-B downlink frequency 145.960 MHz.

/EX
SB SAT @ AMSAT $ANS-359.06
FO-21 GOES MULTIMEDIA!

HR AMSAT NEWS SERVICE BULLETIN 359.06 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.06

First FO-20 Color Fax

With the Japanese FO-20 satellite placed into analog mode for the week 1st to 8th of December 1993, Ted G6HMS and Ian G0NKA employed daily 16:00-24:00 UTC passes experimenting at passing FAX pictures through the JA Mode transponder. Once the fine technique of holding the picture by following the Doppler movement on the downlink was overcome, the methodology worked well. Unlike voice transmissions where the ear can compensate for tonal frequency shift, computers decoding Fax signals are far more critical.

By Monday 6th December Ian and Ted had the best yet black and white picture throughput. They then followed this with a full color transmission that produced a 50% success rate. On Tuesday 7th December between 19:59 and 20:03 UTC, transmitting using JV-Fax 6.0 and receiving on the shareware version of Microfax, they succeeded in producing full colour throughput with better than 90% resolution.

On all experiments the LSB uplink used is 145.980 MHz. The downlink USB frequency produced is 435.820 MHz +/- Doppler. The uplink frequency is maintained throughout the pass and the downlink is tuned to compensate for the change of doppler shift.

Ian and Ted will be trying again between December 15th to Feb '94 whenever FO-20 is scheduled to be in analog mode. Please join them if you can.

They look forward to seeing your pictures. Reports would be very welcome.
For schedules, Ian may be contacted via PACKET as G0NKA @ GB7DTX.GBR.EU.

[The AMSAT News Service (ANS) would like to thank G3IOR for this bulletin item. G3IOR can be reached at G3IOR @GB7VLS]

/EX
SB SAT @ AMSAT $ANS-359.07
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 359.07 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 26, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-359.07

Weekly OSCAR Status Reports: 26-DEC-93

AO-13: Current Transponder Operating Schedule:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Nov 15-Jan 31
Mode-B : MA 0 to MA 95 !
Mode-B : MA 95 to MA 180 !
Mode-B : MA 180 to MA 218 !
Mode-S : MA 218 to MA 220 !<- S Beacon only
Mode-S : MA 220 to MA 230 !<- S Transponder; B trsp. is OFF
Mode-BS : MA 230 to MA 256 ! Blon/Blat 240/-5
Omnis : MA 250 to MA 150 ! Move to attitude 180/0, Jan 31
[G3RUH/DB2OS/VK5AGR]

FO-20: The following is the current FO-20 operating schedule:
From December '93 thru February '94, the analog mode and the
digital mode will be on alternately for a week at a time.
ANALOG MODE:
29-DEC-93 8:30 -TO- 05-JAN-94 8:50 UTC
12-JAN-94 7:30 -TO- 19-JAN-94 7:50 UTC
26-JAN-94 8:20 -TO- 02-FEB-94 6:50 UTC
09-FEB-94 7:15 -TO- 16-FEB-94 7:40 UTC
DIGITAL MODE: Unless otherwise noted above. [JJ1WTK]

DOVE: At 05:30 UTC, 24-DEC-93, WD0E put DOVE back into the state where it is sending telemetry every 20 seconds. The RF output transmitter power is back up to about 3 watts. Also, in response to several inquries, the S-band transmitter is back on. There is also a season's greetings message in the text broadcast. [WD0E]

MIR: MIR has indeed been on voice recently! KB9BNR read that MIR has been QRT on voice for a long time. KB9BNR states it this has not been case. N9OUU worked Alexander Serebrov (R0MIR) two weeks ago as it passed over Davenport, IA. KB9BNR know this because everytime N9OUU works MIR, N9OUU calls him! Checkout KB9BNR's new landline BBS at (309) 797-3827. He has lots of AMSAT information.
[KB9BNR AMSAT Area Coordinator]

RS-12: The major solar event and Kp7 prediction produced some remarkable long distance sub-horizon paths for the RS-12 Mode 'K' satellite on December 1st. GM4IHJ alerted G3IOR that he had been copying the 29.407 MHz beacon long before his calculated horizon AOS. G3IOR took the pass that showed a AOS of 13:15 UTC, but had excellent copy of the downlink and beacon from 1300 when the satellite was passing over Mexico right up the central United States, in line of sight range of all US and VE call areas. The extension continued until the satellite was over UA9, within range of UA0 and JA. Sadly (apart from G3IOR) there were no stations active on RS-12 over the period of study. It would appear that such conditions are produced just before solar storms, and as GM4IHJ and NM7M forecast, when the interplanetary field is reversed. In a follow-up status report on this event, G3IOR says the extended northerly polar subhorizon paths for RS-12 seem to have disappeared this past week, to be replaced by extensions to the normal LOS by up to eight minutes on passes going out between 180 and 240 degrees azimuth. G3IOR worked K1FX (SSB) and N4ZC (CW) plus several Europeans mutual sub-horizon. Heard but got away included KN4UI and VE3CRG. Within mutual horizon QSO's inluded GW3NXR, EI7AF, UA9WE, UA1AP, UB5OA, EA7CEZ, LA1IC, UA1ADY, DJ6EA, G3FBN, SP4DCA, ER1RR and OZ4ZO. [G3IOR]

PoSAT: G3AAJ reports that PoSAT will place it's amateur radio section on (38.4 KBauds?) on January 6, 1994. No OSCAR enumeration has yet been given (or sought?) for PoSAT. [G3IOR]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

515. Re: AEA DSP-2232 Software Update?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-26 16:44:26 UTC
From: eac@world.std.com
Message-ID: <CInII2.6A0@world.std.com>
Source record: 28375

In <756415810.AA00278@afarm.uucp> Ron.Parsons@f40.n382.z1.fidonet.org (Ron Parsons) writes:
>Call AEA for ordering. I think it is $30 plus s/h.

Hello,
It is $15 plus 5.50 shipping and handling. I called up soon after it was announced and got quoted a price of $86 dollars. The woman handling the Upgrade Order line said the $15 dollar price quoted on Compuserve was wrong. When brought up on Compuserve and by calling AEA the next week I found out I was overcharged and the $15 dollar price was right!

Someone also left a message on compuserve saying that he faxed an order for the Upgrade for $15 dollars + S/H and someone from AEA called back and told him the price was $30 dollars.

I would suggest to Ron or anyone with the DSP boxes that paid more than $20.50 ($15+5.50 S/H) to contact AEA and get this straighten out. Hopefully putting the charge in dispute with the Credit Card company or contacting the US Post Office will not be needed.

73 Eric eac@world.std.com

516. Re: Santa in orbit?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-26 20:34:34 UTC
From: kchen@apple.com
Message-ID: <2fksgq$l8v@apple.com>
Source record: 28376

koffer@indial1.io.com (koffer) writes:

>According to the satellite tracking program I have, the Hubble Space
>Telescope will pass over Austin on Friday, Christmas Eve. It will be
>visible from 6:05pm CST to 6:09pm CST, and will track from west to east,
>reaching a maximum elevation of 69 degrees (i.e. near overhead) off the
>horizon to the south.

Speaking of Santa, how many of you heard Kitsat (I *think* it was
Kitsat) on Christmas day?

Last night on 80m, an amateur was playing back a recording of it.
You first hear the usual bzzz...bzzz... data packets; and suddenly
it burst into what sounded like Jingle Bells played by a chorus of
bells!

The one who played it back on 80m was hoping the FCC was not
listening. I, for one, am glad he played it back -- made my
Christmas!

And a happy new year...

Kok Chen, AA6TY kchen@apple.com
Apple Computer, Inc.

517. Re: Santa in orbit?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 06:58:07 UTC
From: nu7i@indirect.com
Message-ID: <CIoM0v.IsE@news.direct.net>
Source record: 28377

It was explained somewhere that it may not have been illegal for the
Germans and Russians to set that up on the satelite since their rules are
different. 73

--
Happy New Year!
Member: National Federation of the Blind
"Proud, Angry, and Strong" -- Jennifer Restle
(The complete information access agenda - You print it you braille it too!)

518. P3D Frequencies Preliminary

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 16:52:43 UTC
From: 70323.2750@CompuServe.COM
Message-ID: <$ans-361.01.1993@ampr.org>
Source record: 28382
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB SAT @ AMSAT $ANS-361.01
PHASE-3D FREQUENCIES

HR AMSAT NEWS SERVICE BULLETIN 361.01 FROM AMSAT HQ
SILVER SPRING, MD DECEMBER 27, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-361.01

PHASE-3D FREQUENCIES PRELIMINARY

This bulletin is to correct an error appearing in ANS Bulletin ANS-
359.01 PHASE-3D FREQUENCIES.

While that bulletin's subtitle indicated that these frequencies are
"solidified" for Phase-3D, actually, they are preliminary and
comments on specific selections are welcome and will be considered.

Please post any comments via AMSAT.ORG to ON6UG, with a copy to
W3XO, by January 31, 1994

/EX
```

519. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 18:58:57 UTC
From: slegrand@netcom.com
Message-ID: <slegrandCIpJEB.1Kx@netcom.com>
Source record: 28378
Cross-posted to: rec.radio.amateur.space,sci.space

Bob Kupiec (bob@olwejo.UUCP) wrote:
: In <2f2r9b$nc3@hip-hop.sbay.org>, benjie@hip-hop.sbay.org writes:
: >I am getting interested in satel tracking, and I would like
: >suggestions on what tracking shareware I should get.

: For a UNIX system, (or possibly any computer with a good C compiler
: i.e. gcc) SatTrack 1.7 was just released. So far, it's the best
: freely-available tracking software I've found for UNIX. SatTrack does
: not use X, but vt100 screen mapping.

: It's the best UNIX, free, non-X satellite tracker there is.

: If anyone's seen better, feel free to let me know!

: --
: Bob Kupiec, N3MML Internet: bob@zero.com
: Morrisville, PA, USA (or) kupiec@jvnc.net
: 40d12'N 74d49'W +110ft AX.25: n3mml@wb3ftp.#epa.pa.usa.noam
: "Motorola 68k Inside!" PGP key 1F9C51 available ~ Get WiReD

Is there any good freely distributable tracking programs that use X?
BTW, What is the home ftp site for SatTrack?

```
*****************************************************************************
* Shawn P. Legrand * The scientist does not study nature *
* Sr. Systems Programmer * because it is useful; he studies it *
* ICW * because he delights in it, and he *
* (619)-546-2457 * delights in it because it is beautiful. *
* INTERNET: slegrand@netcom.com * - Henri Poincare *
* IBMMAIL: USICWSPI * *
*****************************************************************************
--
*****************************************************************************
* Shawn P. Legrand * The scientist does not study nature *
* Sr. Systems Programmer * because it is useful; he studies it *
* ICW * because he delights in it, and he *
* (619)-546-2457 * delights in it because it is beautiful. *
* INTERNET: slegrand@netcom.com * - Henri Poincare *
* IBMMAIL: USICWSPI * *
*****************************************************************************
```

520. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 20:25:23 UTC
From: tgb@bnu003.usa
Message-ID: <TGB.93Dec27142523@bnu003.usa>
Source record: 28379
Cross-posted to: rec.radio.amateur.space,sci.space

```
>
>Is there any good freely distributable tracking programs that use X?
>BTW, What is the home ftp site for SatTrack?
>
Try xsat for X windows.

$ archie -s xsat

Host gatekeeper.dec.com

Location: /.9/X11/contrib
FILE -r--r--r-- 4173 Apr 10 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 10 1992 xsat1.0.tar.Z

Host harbor.ecn.purdue.edu

Location: /pub/davy
FILE -r--r--r-- 1647479 Apr 9 1992 xsat1.0.tar.Z

Host pdq.coe.montana.edu

Location: /pub/mirrors/X11-contrib
FILE -rw-r--r-- 1973 Apr 8 1992 xsat.README.gz
FILE -rw-r--r-- 1059650 Mar 28 1993 xsat1.0.tar.gz

Host sunsite.unc.edu

Location: /pub/X11/contrib
FILE -rw-r--r-- 4173 Sep 8 1992 xsat.README
FILE -rw-r--r-- 1647479 Sep 8 1992 xsat1.0.tar.Z
Host cs.columbia.edu

Location: /archives/mirror1/X11R5/contrib
FILE -rw-rw-r-- 4173 Apr 9 1992 xsat.README
FILE -rw-rw-r-- 1062429 Apr 9 1992 xsat1.0.tar.gz

Host dimacs.rutgers.edu

Location: /pub/workshop/avg
FILE -rwxr-xr-x 81920 Oct 10 09:25 maxsatJul30

Host ftp.cs.umn.edu

Location: /pub/X/contrib
FILE -r--r--r-- 4173 Apr 9 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 9 1992 xsat1.0.tar.Z

Host ftp.germany.eu.net
```

Location: /X11/contrib
FILE -r--r--r-- 4173 Apr 10 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 10 1992 xsat1.0.tar.Z

Host ftp.luth.se

Location: /pub/X11/contrib
FILE -r--r--r-- 4173 Apr 10 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 10 1992 xsat1.0.tar.Z

Host ftp.msen.com

Location: /pub/gopher/stuff/stuff.old/sci.all
FILE -rw-rw-r-- 3437 Apr 15 1992 .xsat.announce

Host ftp.sunet.se

Location: /pub/X11/contrib
FILE -r--r--r-- 4173 Apr 9 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 9 1992 xsat1.0.tar.Z

Host ftp.uu.net

Location: /pub/window-sys/X/contrib
FILE -rw-r--r-- 2479 Apr 9 1992 xsat.README.Z
DIRECTORY drwxr-xr-x 512 Nov 19 1992 xsat1.0.tar.Z-split

Host ftp.wustl.edu

Location: /packages/X11R5/contrib-pub
FILE -r--r--r-- 4173 Apr 8 1992 xsat.README
FILE -r--r--r-- 1647479 Apr 8 1992 xsat1.0.tar.Z

--

How many software patents have you infringed upon today?
tgb@bnu003.cncc.bnr.com home bnu002.uucp!tommyb!tom@bnu003.bnr.com

521. SatTrack 1.7 / Xsat / Xephem / SFS

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 22:27:11 UTC
From: kupiec@tigger.jvnc.net
Message-ID: <1993Dec27.222711.1729@tigger.jvnc.net>
Source record: 28380
Cross-posted to: sci.space,sci.space.shuttle,rec.radio.amateur.space

Since a few people have sent email wondering where SatTrack 1.7 can be found. It's at at ucsd.edu, dir "hamradio/packet/tcpip/incoming".

Again SatTrack is a realtime satellite tracker that uses vt100 screen mapping. You don't need X11 or curses.

=======

Now onto more interesting questions. ;-) Has anyone stipped Xsat down to use just it's Postscript mapping? I want to run Xsat on a non-X workstation and print the Postscript maps. I guess I could hack at the code again, but I'm wondering if someone has done it already.

The reason being I'm using all of the programs mentioned in the Subject: header and each of them has useful features. Does somebody want to combine all of them and save me a whole bunch of work? ;-)

Xsat: uses N3EMO's "orbit" to generate Postscript tracking maps
SatTrack: provides real-time data on a satellite
SFS (Space Flight Simulator): Has a nice X display, somewhat like on NASA Select TV
Xephem: Can track earth satellites in real-time, but meant for planets/stars.

--
Bob Kupiec Email: kupiec@jvnc.net JvNC (GES, Inc.)
Network Operations Ham: N3MML 3 Independence Way
Phone: 609-897-7319 Fax: 609-897-7310 Princeton, NJ 08540

522. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 22:32:36 UTC
From: kupiec@tigger.jvnc.net
Message-ID: <1993Dec27.223236.1865@tigger.jvnc.net>
Source record: 28381
Cross-posted to: rec.radio.amateur.space,sci.space

In <slegrandCIpJEB.1Kx@netcom.com>, slegrand@netcom.com writes:
>Bob Kupiec (bob@olwejo.UUCP) wrote:
>: In <2f2r9b$nc3@hip-hop.sbay.org>, benjie@hip-hop.sbay.org writes:
>: >I am getting interested in satel tracking, and I would like
>: >suggestions on what tracking shareware I should get.
>
>: For a UNIX system, (or possibly any computer with a good C compiler
>: i.e. gcc) SatTrack 1.7 was just released. So far, it's the best
>: freely-available tracking software I've found for UNIX. SatTrack does
>: not use X, but vt100 screen mapping.
>
>BTW, What is the home ftp site for SatTrack?

I'm posting the release note for SatTrack 1.7 in case you have not
seen it.

Bob

Hello satellite enthusiasts,

the latest version of the satellite tracking program I've written for Unix
machines is pretty much ready to be used. I hope most of the bugs have been
found (at least the remaining ones ought to be of minor impact). You can get
SatTrack from ucsd.edu (128.54.16.1). Do the following:

ftp ucsd.edu
login anonymous
cd hamradio/packet/tcpip/incoming
get sattrack.V1.7.tar.Z

Place this file into your Unix home directory, uncompress it, and then
type 'tar xvpf sattrack.V1.7.tar'. This will unbundle the distribution file
and create all subdirectories that are necessary. Then look into the
documentation file 'sattrack.doc' in SatTrack/Doc for instructions how to
compile sattrack (and some other auxiliary programs). Please let me know how
it works and if there are any bugs that I haven't encountered yet. It should
compile perfectly on at least Sun-3's (SunOS 4.0.3) and SPARCstation IPCs
(SunOS 4.1.1). Some machines require stdlib.h to be included. In this case
comment out the line

#define SUNOS4

in sattrack.h before compilation. I hope this program is helpful to you.

73, Manfred --- W6/DL5KR

Manfred Bester
Space Sciences Lab
University of California
Berkeley, CA 94720
(510) 642-8497

--
Bob Kupiec Email: kupiec@jvnc.net JvNC (GES, Inc.)
Network Operations Ham: N3MML 3 Independence Way
Phone: 609-897-7319 Fax: 609-897-7310 Princeton, NJ 08540

523. What was the first major use of PRML signal processing scheme?

Newsgroup: rec.radio.amateur.space
Date: 1993-12-27 23:14:00 UTC
From: mikeross@almaden.ibm.com
Message-ID: <19931227.151542.772@almaden.ibm.com>
Source record: 28383
Cross-posted to: rec.radio.amateur.space,sci.space

I'm helping a magazine editor check some facts in a draft article on digital-read disk drives and thought someone here might be able to help with one of his questions:

What was the first significant application of the PRML (partial-response/maximum likelihood) digital signal processing technique?

The editor understands that it was in the communication setup with deep space probes (such as the Viking Lander). True? If not, what were earlier examples?

Unfortunately, the magazine's deadline is Tuesday, Dec 28. So a rapid reply (or pointer to a reference) would be greatly appreciated.

Many thanks,

Mike Ross
Communications (PR)
Almaden Research Center

524. Post your Sat-Track software pick here

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 01:02:51 UTC
From: keating@manta.nosc.mil
Message-ID: <1993Dec28.010251.8520@nosc.mil>
Source record: 28384

Re: Satelite tracking software for PCs and Macs but no compromises.

I'm sure this has been asked before I read this group, but I am still needing
the information. There was interesting discussion of the satelite tracking
software for X-windows like machines or unix boxes with VT100's (ugh!!)
but what about the rest of us. I have no intention of ever using a unix
box for satelite tracking, but I might find a PC (or dare I get greedy and
hope for a Mac with a large color display) available. I've seen some line
based output for PCs with EGA, and one less than satisfactory program for
the PC with VGA, but I'd like a really good tracking program - one that
has plenty of features, plenty of support, can be customized, and provides
control for tracking antennas and predictive displays. I want it all, and
I want to pay share-ware prices for it. Well I want it all anyway.
I'm willing to pay my-share prices.

What is the short list of software to consider for Macs and PCs with
VGA and possibly (bleh..) MS Windows?

Please post replies as I'm confident others will want to see, and I'll
just have to ask you permission to post your replies to me. Let's just
have the discussion on the usenet, OK?

Roger Keating - KD6EFQ
_ . _ _ . . _ . . . . . _ . _ _ . _ . . . _ . _
Roger Keating, Cognitive Engineer PS&E keating@nosc.navy.mil | KD6EFQ
Naval Command, Control and Ocean Surveillance Center RDTE DIV | VHF DX is
NRaD Advanced Afloat System HCI - Code 44209 | Fun!
53245 Patterson Rd, San Diego CA 92152-7150 USA | Try it.

525. Re: Satel Tracking Software

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 03:38:09 UTC
From: raptor!rlove
Message-ID: <1993Dec28.033809.11034@nugget.rmNUG.ORG>
Source record: 28386
Cross-posted to: rec.radio.amateur.space,sci.space

In article <slegrandCIpJEB.1Kx@netcom.com> slegrand@netcom.com (Shawn P. Legrand) writes:
> BTW, What is the home ftp site for SatTrack?

Good question. When I tried to unpack ver 1.7 it failed.
--

Bob Love rlove@raptor.rmnug.org (NeXT Mail OK)
BIX: rlove
---

526. Re: Post your Sat-Track software pick here

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 05:05:09 UTC
From: fmitch@netcom.com
Message-ID: <fmitchCIqBGo.CD5@netcom.com>
Source record: 28385

Roger Keating (keating@manta.nosc.mil) wrote:
: Re: Satelite tracking software for PCs and Macs but no compromises.
<much deleted>
: What is the short list of software to consider for Macs and PCs with
: VGA and possibly (bleh..) MS Windows?

: Please post replies as I'm confident others will want to see, and I'll
: just have to ask you permission to post your replies to me. Let's just
: have the discussion on the usenet, OK?

: Roger Keating - KD6EFQ
: _ . _ _ . . _ . . . . _ . _ _ . _ . . . _ . _
: Roger Keating, Cognitive Engineer PS&E keating@nosc.navy.mil | KD6EFQ
: Naval Command, Control and Ocean Surveillance Center RDTE DIV | VHF DX is
: NRaD Advanced Afloat System HCI - Code 44209 | Fun!
: 53245 Patterson Rd, San Diego CA 92152-7150 USA | Try it.

the short list includes:

instatrack @~$50 from amsat-na, worth every penny, and will
interface with the kansas city tracker board for az/el
rotor control... has room for 200 satellites, very easy
to use... for price, is as impressive as any commercial
software i have ever bought...

realtrak - @~$65 from author or from r. myers communications...
very good but skewed toward moon bounce operators... author
very accessable (was at dayton) and very good upgrade policy..
also will control rotors...

quiktrak - written by software guru who lurks the net here,
n4hy... very good but now getting a little dated... what
about it bob??? i'm not sure about current pricing but
i think it is available from amsat-na ...

trakbox - well, not a pc type program but a stand alone
controller available as a kit from tapr, has lcd
display, you download keps via serial port and it does
the rest... tracks, controls az/el, automatically
switches to sat as it becomes visable at your qth
and you can prioritize which sat it will look at
if more than one is visable (and with what seems
like a new sat going online every month, there are
lots of 'em visable at the same time)... price is
~$175 from tapr, they will have new batch of kits
available in feb, contact them on the net tapr.org

the trakbox was jointly developed by tapr and
jamsat (japanese amsat) with much assistance from
jack, wa4ejr@tapr.org (tell him mitch sent you)...

you can't go wrong with any of the above!!! my trakbox is almost ready...
i got tired of my computer being tied up tracking and the aggravation
of trying to get tracking, satellite sequencing, and pg/pb all
running at the same time under desqview... with the trakbox doing
the tracking/sequencing of my antennas it should be much easier
to get pg/pb properly sequenced for *completely* (well, almost)
unattended pacsat operation... (and i wouldn't have sold my dsp-2232
if i had known aea was trying to fix the dsp-2232/pg timing glitch)

any other comments???

mitch, wa4osr

--
---
fmitch@netcom.com
Felton "Mitch" Mitchell, WA4OSR in Mobile, Alabama USA
205-342-7259 home, 205-476-4100 work, 205-476-0465 FAX
co-sysop for W4IAX bbs running fbb ... sysop for WA4OSR DXCluster in Mobile..
---

527. Re: 10m rx (really 2m tx)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 15:11:04 UTC
From: lkollar@nyx10.cs.du.edu
Message-ID: <1993Dec28.151104.8572@mnemosyne.cs.du.edu>
Source record: 28387

kerskine@ftp.com (Keith Erskine) writes:

> I've tried in vain to find any sort of plan for
>building a 2m CW/SSB transmitter.

A 2m CW transmitter shouldn't be too hard. I'd approach it by first building a 10m tx then adding mixer & amplification stages. I'm trying to find time to homebrew a 435 MHz CW transmitter... it's still in the sketch/wad up/toss/repeat phase. :-)

You can usually find a decent 2m all-mode for ~$200 at hamfests. I paid $175 for a Kenwood TR-2900, a 10W mobile-size rig, and it works great for RS-10.

Wishing there were 36 hours in a day (or that I didn't need to sleep!), I am --
--
Larry Kollar, KC4WZK | I like CW, but that doesn't mean I think every ham
lkollar@nyx.cs.du.edu | should have to learn it.
"On the Internet, nobody knows you're a dog."

528. Downlink Frequencies Wanted

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 15:47:00 UTC
From: lynch@stars.gsfc.nasa.gov
Message-ID: <28DEC199311473191@stars.gsfc.nasa.gov>
Source record: 28388

Does anyone know where I can get a list of satellite downlink frequencies?
I am looking for whatever I can get.

Thanks
Dave Lynch

529. Any FAX software for AEA DSP-2232 ???

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 17:46:54 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7930@gold.gvg.tek.com>
Source record: 28389
Cross-posted to: rec.radio.amateur.misc,rec.radio.amateur.space,sci.geo.meteorology

I am interested in receiving both AM (NOAA 137MHz) and FM (WEFAX) FAX images.
I have a DSP-2232 and it seems to have the modems to decode these modes.

I have tried various software, AEA 900 FAX, AEA WEFAX (that $99 device), and
JVFAX (with all of its modes) to interface with the DSP-2232 with no luck.

Does anyone know of any software (PC or Mac) that works the DSP-2232 to receive
fax images?

Thanks,
Randy Hall
WA2AGE

randyh@gvgadg.gvg.tek.com
wa2age@amsat.org

530. FAX software for AEA DSP-2232 ???

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 20:00:40 UTC
From: randyh@gvgadg.gvg.tek.com
Message-ID: <7932@gold.gvg.tek.com>
Source record: 28390
Cross-posted to: rec.radio.amateur.space,sci.geo.meteorology

I am interested in receiving both AM (NOAA 137MHz) and FM (WEFAX) FAX images.
I have a DSP-2232 and it seems to have the modems to decode these modes.

I have tried various software, AEA 900 FAX, AEA WEFAX (that $99 device), and
JVFAX (with all of its modes) to interface with the DSP-2232 with no luck.

Does anyone know of any software (PC or Mac) that works the DSP-2232 to receive
fax images?

Thanks,
Randy Hall
WA2AGE

randyh@gvgadg.gvg.tek.com
wa2age@amsat.org

531. Re: Post your Sat-Track software pick here

Newsgroup: rec.radio.amateur.space
Date: 1993-12-28 21:43:51 UTC
From: marchant@tunitas.Berkeley.EDU
Message-ID: <2fq9an$8ng@agate.berkeley.edu>
Source record: 28391

For Mac people I would strongly recommend the shareware program OrbiTrack. It is available on the sumex archive. You can also try a program called SatTrack (I believe). This is another shareware Mac program (don't confuse it with DL5KR's UNIX SatTrack). It is more amateur radio oriented but not as good, IMHO. It is also on sumex. Several years ago I bought a copy of "Satellite Pro" from AMSAT. The author of the program and I had a nice talk about his software but I ended up returning it. The author was planning a major new revision and so someone else should probably post a review.

OrbiTrack does output controller codes for an older antenna interface. I bought one of Ron Longs (W8GUS) trak-box like standalones to control my antenna array. SOrry, I don't remember if SatTrack has an antenna interface. Satellite-Pro needed a couple of hundred dollar interface box before it would talk to the rotor.
--

Will Marchant Center for Extreme Ultraviolet Astrophysics
marchant@cea.berkeley.edu University of California
KC6ROL@N0ARY 2150 Kittredge St., Berkeley, CA 94720 USA

532. ARLK054 Keplerian Data

Newsgroup: rec.radio.amateur.space
Date: 1993-12-29 14:10:44 UTC
From: lhurder@arrl.org
Message-ID: <$arlk054.1993@ampr.org>
Source record: 28392
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEP @ ARL $ARLK054
ARLK054 Keplerian data

ZCZC SK66
QST de W1AW
Keplerian Bulletin 54 ARLK054
From ARRL Headquarters
Newington, CT December 28, 1993
To all radio amateurs

SB KEP ARL ARLK054
ARLK054 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

AO-10
1 14129U 83058 B 93329.34450477 0.00000009 10000-3 0 2132
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 50611
RS-10/11
1 18129U 87054 A 93353.78531718 0.00000039 25711-4 0 8392
2 18129 82.9275 101.4555 0012165 156.0268 204.1456 13.72328016325308
UO-11
1 14781U 84021 B 93352.06493232 0.00000249 50253-4 0 6199
2 14781 97.7951 10.1968 0012338 124.9246 235.3121 14.69103843523715
RS-12/13
1 21089U 91007 A 93353.88399174 0.00000021 60794-5 0 6416
2 21089 82.9202 144.4175 0028238 247.3749 112.4421 13.74031650144026
AO-13
1 19216U 88051 B 93356.82690458 -.00000763 10000-4 0 8506
2 19216 57.9666 277.5430 7210696 330.9913 3.3970 2.09727363 10818
UO-14
1 20437U 90005 B 93353.73078132 0.00000064 42114-4 0 9405
2 20437 98.6029 75.8633 0011465 2.5266 357.5973 14.29811303203941
AO-16
1 20439U 90005 D 93353.72330553 0.00000066 42857-4 0 7419
2 20439 98.6110 76.9082 0011736 2.7801 357.3445 14.29867859203952
DO-17
1 20440U 90005 E 93353.76501518 0.00000053 37667-4 0 7415
2 20440 98.6116 77.2143 0011897 2.5935 357.5307 14.30005317203972
```

```
WO-18
1 20441U 90005 F 93353.73726563 0.00000047 35071-4 0 7423
2 20441 98.6108 77.1992 0012470 1.9872 358.1359 14.29982522203970
LO-19
1 20442U 90005 G 93353.72731485 0.00000075 45923-4 0 7408
2 20442 98.6123 77.4062 0012815 1.5633 358.5590 14.30075638203988
FO-20
1 20480U 90013 C 93355.44982285 -.00000017 32207-4 0 6380
2 20480 99.0168 176.0166 0541260 22.2699 340.0980 12.83222967181336
AO-21
1 21087U 91006 A 93357.16575150 0.00000094 82657-4 0 3999
2 21087 82.9459 272.9683 0033939 213.7252 146.1744 13.74530786145408
UO-22
1 21575U 91050 B 93353.75748489 0.00000109 51387-4 0 4419
2 21575 98.4535 66.7225 0008505 101.5487 258.6654 14.36875041127317
KO-23
1 22077U 92052 B 93353.94580435 -.00000037 10000-3 0 3377
2 22077 66.0886 295.2665 0006949 331.1179 28.9453 12.86282320 63736
Arsene
1 22654U 93031 B 93321.93138545 -.00000051 10000-3 0 2107
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
KO-25
1 22827U 93061 E 93353.73178714 -.00000007 15197-4 0 3023
2 22827 98.6645 66.1771 0009427 6.6008 353.5299 14.27800566 12087
IO-26
1 22826U 93061 D 93353.94801570 0.00000021 26616-4 0 2402
2 22826 98.6737 66.4193 0009857 18.2897 341.8607 14.27698719 12113
AO-27
1 22825U 93061 C 93353.74382815 0.00000041 34677-4 0 2391
2 22825 98.6733 66.2045 0009172 18.4935 341.6577 14.27596448 12083
PO-28
1 22829U 93061 G 93353.79061720 0.00000095 56185-4 0 2329
2 22829 98.6671 66.2636 0010487 5.2318 354.8962 14.27991712 12092
Mir
1 16609U 86017 A 93356.89342327 0.00012770 16562-3 0 628
2 16609 51.6187 351.4352 0005780 118.8381 241.3181 15.59225375448544

Keplerian bulletins are transmitted twice weekly from W1AW.
The next scheduled transmission of these data will be Saturday,
January 1, 1994, at 2330z on Baudot and AMTOR.
NNNN
/EX
```

533. Re: 10m rx (really 2m tx)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-29 17:56:13 UTC
From: PEITZER@delphi.com
Message-ID: <931229.46573.PEITZER@delphi.com>
Source record: 28394

How about building a transmit converter right out of the ARRL handbook, and converting an HF rig up (or build a 10 meter transmitter to drive it)?

534. Re: Post your Sat-Track software pick here

Newsgroup: rec.radio.amateur.space
Date: 1993-12-30 13:07:44 UTC
From: n4hy@wahoo.ccr-p.ida.org
Message-ID: <N4HY.93Dec30130744@wahoo.ccr-p.ida.org>
Source record: 28393

Quiktrak and Instantrak are both still available from AMSAT. Quiktrak is
a little old and Instantrak and it both use EGA. There is a need for a
new one. I have one in the works that I will not say much about at
present. It will support ONLY modern facilities. Sorry to those of you
who have 80286's and before but the utilities needed to support the older
stuff costs space, money, and time that is just not available if you also
wish to `keep up.'

I would say that Instantrak and Quiktrak are very complimentary set of
tools but if I had to pick ONE, I would pick Instantrak. Quiktrak does
things Instantrak does NOT do and vice versa. If you want contact
Keith Pugh, W5IU and get an unbiased opinion, and a list of the capabilities
which distinguishes them.

Bob
--
Robert W. McGwier | n4hy@ccr-p.ida.org Interests: ham radio,
Center for Communications Research | scouts, astronomy, golf (o yea, & math!)
Princeton, N.J. 08520 | ASM Troop 5700, ACM Pack 53 Hightstown
(609)-279-6240(v) (609)-924-3061(f)| I used to be a Buffalo . . . NE III-120

535. Re: 10m rx (really 2m tx)

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 01:33:26 UTC
From: galen@picea.CFNR.ColoState.EDU
Message-ID: <Dec31.013326.85905@yuma.ACNS.ColoState.EDU>
Source record: 28395

In article <931229.46573.PEITZER@delphi.com> PEITZER@delphi.com writes:
>How about building a transmit converter right out of the ARRL handbook, and
>converting an HF rig up (or build a 10 meter transmitter to drive it)?
You could get a Uniden HR2600 and tap in before the finals.
I'm doing it,
Galen, KF0YJ, DN70

536. Two-Line Orbital Element Set Format

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 04:11:10 UTC
From: tkelso@afit.af.mil
Message-ID: <tkelso.757311070@afit.af.mil>
Source record: 28397
Cross-posted to: rec.radio.amateur.space,rec.radio.info

As a service to the satellite user community, the following description of the NORAD two-line orbital element set format is uploaded to sci.space.news and rec.radio.info on a monthly basis. The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity. In addition, element sets (also updated daily) and some documentation and software are also available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

==========

Data for each satellite consists of three lines in the following format:

```
AAAAAAAAAAA
1 NNNNNU NNNNNAAA NNNNN.NNNNNNNN +.NNNNNNNN +NNNNN-N +NNNNN-N N NNNNN
2 NNNNN NNN.NNNN NNN.NNNN NNNNNNN NNN.NNNN NNN.NNNN NN.NNNNNNNNNNNNN
```

Line 0 is a eleven-character name.

Lines 1 and 2 are the standard Two-Line Orbital Element Set Format identical to that used by NORAD and NASA. The format description is:

```
Line 1
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
10-11 International Designator (Last two digits of launch year)
12-14 International Designator (Launch number of the year)
15-17 International Designator (Piece of launch)
19-20 Epoch Year (Last two digits of year)
21-32 Epoch (Julian Day and fractional portion of the day)
34-43 First Time Derivative of the Mean Motion
or Ballistic Coefficient (Depending on ephemeris type)
45-52 Second Time Derivative of Mean Motion (decimal point assumed;
blank if N/A)
54-61 BSTAR drag term if GP4 general perturbation theory was used.
Otherwise, radiation pressure coefficient. (Decimal point assumed)
63-63 Ephemeris type
65-68 Element number
69-69 Check Sum (Modulo 10)
(Letters, blanks, periods, plus signs = 0; minus signs = 1)
```

Line 2
Column Description
01-01 Line Number of Element Data
03-07 Satellite Number
09-16 Inclination [Degrees]
18-25 Right Ascension of the Ascending Node [Degrees]
27-33 Eccentricity (decimal point assumed)
35-42 Argument of Perigee [Degrees]
44-51 Mean Anomaly [Degrees]
53-63 Mean Motion [Revs per day]
64-68 Revolution number at epoch [Revs]
69-69 Check Sum (Modulo 10)

All other columns are blank or fixed.

Example:

NOAA 6
1 11416U 86 50.28438588 0.00000140 67960-4 0 5293
2 11416 98.5105 69.3305 0012788 63.2828 296.9658 14.24899292346978
--
Dr TS Kelso Assistant Professor of Space Operations
tkelso@afit.af.mil Air Force Institute of Technology

537. Two-Line Orbital Element Sets (TLE317)

Newsgroup: rec.radio.amateur.space
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The most current orbital elements from the NORAD two-line element sets are carried on the Celestial BBS, (513) 427-0674, and are updated daily (when possible). Documentation and tracking software are also available on this system. The Celestial BBS may be accessed 24 hours/day at 300, 1200, 2400, 4800, or 9600 bps using 8 data bits, 1 stop bit, no parity.

Element sets (also updated daily) and some documentation and software are available via anonymous ftp from archive.afit.af.mil (129.92.1.66) in the directory pub/space.

As a service to the satellite user community, the most current of these elements are uploaded weekly to sci.space.news and rec.radio.info.
This week's elements are provided below.

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- Current Two-Line Element Sets #317 -
Alouette 1
1 00424U 62049 93362.32645134 .00000059 00000-0 58492-4 0 9448
2 00424 80.4673 93.5857 0023320 192.4517 167.6055 13.67792306559043
ATS 3
1 03029U 67111A 93364.22567163 -.00000103 00000-0 10000-3 0 1415
2 03029 14.5332 9.1919 0011938 260.6032 164.7690 1.00273409 95748
Cosmos 398
1 04966U 71016A 93364.25057461 .00082552 59212-5 19457-3 0 9002
2 04966 51.4668 254.5709 1192319 237.3570 110.6879 13.49243858749618
Starlette
1 07646U 75010A 93353.84471655 -.00000129 00000-0 12670-4 0 7383
2 07646 49.8190 141.0601 0206091 104.0074 258.3825 13.82185002953047
LAGEOS
1 08820U 76039A 93362.42098441 .00000013 00000-0 10000-3 0 9446
2 08820 109.8488 77.1086 0043927 321.2812 38.4858 6.38664727156244
ETS-2
1 09852U 77014A 93348.29081642 -.00000090 00000-0 10000-3 0 9109
2 09852 11.8209 43.7338 0001406 88.5576 223.9071 1.00024368 8809
GOES 2
1 10061U 77048A 93363.37323662 .00000083 00000-0 10000-3 0 2561
2 10061 10.8848 47.7906 0002593 8.2812 40.6088 1.00283178 5418
IUE
1 10637U 78012A 93364.21787858 -.00000229 00000-0 10000-3 0 9488
2 10637 34.3448 97.6395 1305666 30.8645 357.5329 1.00258506 11033
GPS BI-01
1 10684U 78020A 93331.28584705 -.00000018 00000-0 10000-3 0 2092
2 10684 64.5359 51.5287 0064487 161.9483 198.3465 1.98079803100925
GPS BI-02
1 10893U 78047A 93362.14601913 -.00000031 00000-0 10000-3 0 276
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2 10893 63.5951 289.9477 0213650 13.7449 346.8518 2.01626464114623
GOES 3
1 10953U 78062A 93363.51881241 .00000078 00000-0 10000-3 0 2481
2 10953 9.8096 50.5664 0005441 128.9733 290.3548 1.00261868 10021
SeaSat 1
1 10967U 78064A 93362.26113127 .00000002 00000-0 45407-4 0 2432
2 10967 107.9996 108.4740 0002729 239.6216 120.4656 14.37904589811799
GPS BI-03
1 11054U 78093A 93361.15916827 -.00000036 00000-0 10000-3 0 1401
2 11054 63.3370 286.8251 0043569 176.2726 183.7740 1.93505201111183
Nimbus 7
1 11080U 78098A 93362.23256329 -.00000020 00000-0 20573-4 0 3467
2 11080 99.0742 247.0178 0008259 230.1430 129.8999 13.83726668766432
GPS BI-04
1 11141U 78112A 93361.24631633 -.00000012 00000-0 00000+0 0 8405
2 11141 64.5672 51.5834 0047914 25.8915 334.4312 1.92894850 467
GPS BI-05
1 11690U 80011A 93361.88611064 -.00000006 00000-0 10000-3 0 7374
2 11690 64.9002 52.4511 0143160 198.9916 160.5772 2.00552938116107
GPS BI-06
1 11783U 80032A 93357.03792086 -.00000063 00000-0 10000-3 0 9382
2 11783 62.7640 284.1405 0206077 29.1448 332.0221 2.03456600100371
GOES 5
1 12472U 81049A 93350.58137649 .00000096 00000-0 10000-3 0 7101
2 12472 6.4500 60.1423 0004134 7.4600 87.4401 1.00248254 3933
Cosmos 1383
1 13301U 82066A 93362.25483975 .00000024 00000-0 10445-4 0 2432
2 13301 82.9333 75.0948 0026688 203.5948 156.3975 13.68048158574053
LandSat 4
1 13367U 82072A 93364.13601443 .00000126 00000-0 38097-4 0 4193
2 13367 98.2047 60.5163 0008250 63.2532 296.9510 14.57102314609442
IRAS
1 13777U 83004A 93362.15233656 -.00000237 00000-0 -13332-3 0 5483
2 13777 98.9695 191.6188 0012843 70.3338 289.9210 13.99184525227222
Cosmos 1447
1 13916U 83021A 93361.88485351 .00000095 00000-0 83675-4 0 3438
2 13916 82.9458 138.3935 0038439 144.9191 215.4508 13.74301983539805
TDRS 1
1 13969U 83026B 93357.26801716 -.00000227 00000-0 10000-3 0 2523
2 13969 7.3475 52.9339 0017045 108.9534 181.8090 0.99853332 92
GOES 6
1 14050U 83041A 93353.15907024 -.00000219 00000-0 10000-3 0 1424
2 14050 5.2374 63.0371 0002911 301.0762 58.9367 1.00236885 10984
OSCAR 10
1 14129U 83058B 93329.34450477 .00000009 00000-0 10000-3 0 2133
2 14129 27.1217 354.5434 6014493 132.9243 298.0909 2.06477387 50611
LandSat 5
1 14780U 84021A 93361.77122578 .00000080 00000-0 27805-4 0 36
2 14780 98.1900 59.7372 0005894 73.8533 286.3312 14.57124341522519
UoSat 2
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1 14781U 84021B 93362.07707859 .00000213 00000-0 44030-4 0 6439
2 14781 97.7938 19.7461 0012661 94.0796 266.1858 14.69108205525188
GPS BI-09
1 15039U 84059A 93362.71185839 -.00000005 00000-0 10000-3 0 1485
2 15039 63.8638 46.3909 0056233 218.2161 141.4640 2.00560922 69927
Cosmos 1574
1 15055U 84062A 93361.60095191 .00000028 00000-0 13577-4 0 5431
2 15055 82.9555 191.5739 0027534 337.1577 22.8351 13.73597655477078
GPS BI-10
1 15271U 84097A 93362.14168403 -.00000023 00000-0 10000-3 0 7497
2 15271 62.4508 283.9062 0141856 346.4899 13.1644 2.00576299 67025
Cosmos 1602
1 15331U 84105A 93361.87882312 .00000392 00000-0 43723-4 0 2396
2 15331 82.5349 238.0975 0021912 51.3180 308.9991 14.84228383499108
NOAA 9
1 15427U 84123A 93354.09639046 .00000113 00000-0 84054-4 0 6423
2 15427 99.0778 37.2630 0015442 8.0271 352.1146 14.13572305465048
GPS BI-11
1 16129U 85093A 93362.37938318 -.00000004 00000-0 10000-3 0 5455
2 16129 64.6171 48.4524 0130914 141.6306 219.3870 2.00563810 6733
Mir
1 16609U 86017A 93364.19950354 .00010973 00000-0 14240-3 0 664
2 16609 51.6194 314.7124 0005815 145.1002 215.0377 15.59385717449681
SPOT 1
1 16613U 86019A 93364.17756043 .00000089 00000-0 62356-4 0 6113
2 16613 98.7093 75.6969 0000794 84.6640 275.4626 14.20016207 92573
Cosmos 1766
1 16881U 86055A 93362.29375298 .00000542 00000-0 63117-4 0 1418
2 16881 82.5191 295.7950 0021511 69.9361 290.4169 14.83263290400129
EGP
1 16908U 86061A 93362.08976625 -.00000083 00000-0 10000-3 0 8424
2 16908 50.0136 250.4205 0011111 237.3620 122.6142 12.44408905335463
NOAA 10
1 16969U 86073A 93354.02187208 .00000062 00000-0 44748-4 0 5408
2 16969 98.5124 3.4782 0013795 128.8764 231.3649 14.24851603377095
MOS-1
1 17527U 87018A 93364.20613383 .00000090 00000-0 99794-4 0 34
2 17527 99.0559 71.2850 0001374 59.8075 300.3223 13.94896277349389
GOES 7
1 17561U 87022A 93364.22889787 -.00000032 00000-0 10000-3 0 6655
2 17561 1.1813 77.7320 0003385 324.3398 26.5303 1.00271069 8275
Kvant-1
1 17845U 87030A 93361.89242141 .00013070 00000-0 16868-3 0 6985
2 17845 51.6181 326.3116 0005672 135.9706 224.2722 15.59333021449394
DMSP B5D2-3
1 18123U 87053A 93354.01437322 .00000044 00000-0 45213-4 0 1656
2 18123 98.7886 183.3243 0014190 335.0955 24.9531 14.15324336335661
RS-10/11
1 18129U 87054A 93362.24286562 .00000047 00000-0 35308-4 0 8413
2 18129 82.9283 95.2053 0012703 133.8292 226.3913 13.72328759326464
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Meteor 2-16
1 18312U 87068A 93362.90633642 .00000069 00000-0 48770-4 0 2426
2 18312 82.5571 346.9093 0011148 227.9645 132.0568 13.84017573321504
Meteor 2-17
1 18820U 88005A 93362.20414100 .00000056 00000-0 36911-4 0 2410
2 18820 82.5428 44.6042 0015693 305.2443 54.7243 13.84703211298694
DMSP B5D2-4
1 18822U 88006A 93354.10515213 .00000132 00000-0 77410-4 0 2706
2 18822 98.4631 211.2527 0006669 139.4752 220.6923 14.22910016305055
Glonass 34
1 19163U 88043A 93362.60941063 .00000016 00000-0 10000-3 0 8467
2 19163 64.9472 116.1531 0007520 179.5651 180.4075 2.13101159 43027
Glonass 36
1 19165U 88043C 93356.56492283 .00000016 00000-0 10000-3 0 2376
2 19165 64.9827 116.3476 0002791 3.9542 356.0394 2.13101438 43516
METEOSAT 3
1 19215U 88051A 93363.51033447 -.00000240 00000-0 10000-3 0 8463
2 19215 1.3641 73.0663 0005407 214.1073 279.6984 1.00265883 8213
AO-13
1 19216U 88051B 93356.82690458 -.00000763 00000-0 10000-4 0 8507
2 19216 57.9666 277.5430 7210696 330.9913 3.3970 2.09727363 10818
OKEAN 1
1 19274U 88056A 93362.12789673 .00000351 00000-0 41133-4 0 8417
2 19274 82.5142 35.6886 0018659 209.8054 150.2100 14.82044974295749
Meteor 3-2
1 19336U 88064A 93362.22551918 .00000051 00000-0 10000-3 0 2425
2 19336 82.5429 84.6681 0016253 335.1957 24.8381 13.16962602260759
Glonass 39
1 19503U 88085C 93346.26596435 -.00000014 00000-0 10000-3 0 1130
2 19503 65.7464 355.6230 0006382 176.6085 183.4257 2.13102105 40782
NOAA 11
1 19531U 88089A 93354.12874457 .00000106 00000-0 81723-4 0 4407
2 19531 99.1549 333.8243 0011091 278.6226 81.3688 14.12942396269933
TDRS 2
1 19548U 88091B 93353.39270124 -.00000278 00000-0 10000-3 0 8490
2 19548 0.6228 79.2129 0002975 177.0715 270.7606 1.00260590 6409
Glonass 40
1 19749U 89001A 93361.79140212 .00000010 00000-0 10000-3 0 3502
2 19749 64.9492 115.7803 0006059 258.7177 101.1972 2.13102202 38621
Glonass 41
1 19750U 89001B 93350.11683020 .00000021 00000-0 10000-3 0 2362
2 19750 64.9587 116.2034 0014751 175.1025 185.0829 2.13102012 38397
GPS BII-01
1 19802U 89013A 93355.23638582 .00000075 00000-0 10000-3 0 8459
2 19802 55.0714 146.7649 0035613 173.7998 186.2395 2.00570299 35481
Akebono
1 19822U 89016A 93362.53813028 .00023078 00000-0 13771-2 0 1723
2 19822 75.0919 278.5155 3837818 55.6830 335.0156 7.73858239 96047
Meteor 2-18
1 19851U 89018A 93362.79483548 .00000079 00000-0 57302-4 0 2429
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2 19851 82.5220 279.7621 0014935 351.2669 8.8229 13.84353093244113
MOP-1
1 19876U 89020B 93363.58213919 .00000002 00000-0 10000-3 0 7479
2 19876 0.1430 6.8728 0001408 318.9408 341.2796 1.00266558 5378
TDRS 3
1 19883U 89021B 93364.22091948 -.00000254 00000-0 00000+0 0 8540
2 19883 0.0556 119.1697 0000441 73.1482 304.8275 1.00268174 87772
GPS BII-02
1 20061U 89044A 93363.05667526 -.00000064 00000-0 10000-3 0 8517
2 20061 54.7326 323.3936 0125835 206.1932 153.1564 2.00566274 33388
Nadezhda 1
1 20103U 89050A 93362.58665388 .00000016 00000-0 61826-6 0 9446
2 20103 82.9584 53.5780 0039078 45.9135 314.5225 13.73830104224882
GPS BII-03
1 20185U 89064A 93363.39469268 .00000051 00000-0 10000-3 0 8544
2 20185 54.9069 147.0890 0006611 234.3245 125.5768 2.00548863 31966
GMS 4
1 20217U 89070A 93363.25244119 -.00000268 00000-0 10000-3 0 9584
2 20217 0.1562 70.5089 0000224 252.0537 6.3059 1.00269010 16389
GPS BII-04
1 20302U 89085A 93361.43101211 -.00000001 00000-0 10000-3 0 8537
2 20302 53.6742 263.9015 0004696 321.9400 38.0912 2.00562488 30726
Meteor 3-3
1 20305U 89086A 93362.87463836 .00000044 00000-0 10000-3 0 9564
2 20305 82.5503 27.7388 0007101 1.6384 358.4743 13.04420277200692
COBE
1 20322U 89089A 93363.52656445 .00000270 00000-0 20087-3 0 9421
2 20322 98.9851 16.8264 0009393 25.0068 335.1552 14.03430036210598
Kvant-2
1 20335U 89093A 93363.87793781 .00017846 00000-0 22736-3 0 7904
2 20335 51.6179 316.3328 0005805 139.7158 214.0264 15.59389102449630
GPS BII-05
1 20361U 89097A 93355.45355345 -.00000038 00000-0 10000-3 0 7426
2 20361 55.4279 89.3610 0071534 104.6219 256.1846 2.00567147 20080
SPOT 2
1 20436U 90005A 93363.22992449 .00000095 00000-0 65161-4 0 7203
2 20436 98.7386 75.0477 0001040 47.9466 312.1821 14.20032721203970
UO-14
1 20437U 90005B 93362.19825192 .00000046 00000-0 34841-4 0 9422
2 20437 98.6028 84.2277 0011292 337.6205 22.4483 14.29812711205154
UO-15
1 20438U 90005C 93362.19523512 .00000013 00000-0 22210-4 0 7434
2 20438 98.6028 83.3825 0010419 341.2492 18.8304 14.29156425205089
PACSAT
1 20439U 90005D 93362.19044136 .00000021 00000-0 25387-4 0 7432
2 20439 98.6109 85.2804 0011413 338.4753 21.5948 14.29868863205161
DO-17
1 20440U 90005E 93362.72112281 .00000022 00000-0 25520-4 0 7430
2 20440 98.6115 86.0734 0011486 336.0862 23.9786 14.30006589205253
WO-18
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1 20441U 90005F 93362.27369208 .00000029 00000-0 28118-4 0 7448
2 20441 98.6107 85.6427 0012153 337.9287 22.1370 14.29983727205191
LO-19
1 20442U 90005G 93362.19321976 .00000022 00000-0 25674-4 0 7425
2 20442 98.6119 85.7807 0012433 337.6335 22.4304 14.30076764205196
GPS BII-06
1 20452U 90008A 93353.36673899 .00000039 00000-0 10000-3 0 8449
2 20452 54.0668 203.8362 0053520 72.1017 288.5519 2.00567007 28545
MOS-1B
1 20478U 90013A 93354.71141291 .00000091 00000-0 10000-3 0 5523
2 20478 99.0524 66.0875 0001184 73.6390 286.4898 13.94890580117760
DEBUT
1 20479U 90013B 93362.50017558 -.00000038 00000-0 -11300-4 0 7405
2 20479 99.0189 181.8119 0540894 6.1152 354.6231 12.83312331182242
FO-20
1 20480U 90013C 93364.10373196 -.00000018 00000-0 32924-4 0 6409
2 20480 99.0174 183.0203 0541189 2.6742 357.7056 12.83223163182445
MOS-1B R/B
1 20491U 90013D 93361.52659433 .00000478 00000-0 97153-3 0 9467
2 20491 99.0350 221.1955 0469137 250.1784 104.8192 13.02977658184305
LACE
1 20496U 90015A 93364.19015598 .00003903 00000-0 13247-3 0 3482
2 20496 43.1022 288.8934 0012942 348.5630 11.4930 15.31952976215592
Nadezhda 2
1 20508U 90017A 93353.59477708 .00000054 00000-0 41017-4 0 9415
2 20508 82.9546 194.8698 0045718 21.7855 338.5230 13.73465622190899
OKEAN 2
1 20510U 90018A 93362.47523283 .00000352 00000-0 45190-4 0 2427
2 20510 82.5216 343.3745 0020771 31.1451 329.0988 14.78210076206446
INTELSAT-6
1 20523U 90021A 93363.69691288 -.00000228 00000-0 20000-3 0 3506
2 20523 0.0153 9.1532 0000911 262.5734 42.7385 1.00267905 6907
GPS BII-07
1 20533U 90025A 93362.24899078 -.00000066 00000-0 10000-3 0 8502
2 20533 55.0725 323.8789 0040882 82.4899 277.9722 2.00567048 27491
PegSat
1 20546U 90028A 93362.59749441 .00009007 00000-0 23313-3 0 5595
2 20546 94.1124 202.1772 0077636 225.6968 133.7900 15.36010592206056
HST
1 20580U 90037B 93363.20816968 .00000799 00000-0 64998-4 0 4134
2 20580 28.4701 247.6909 0006246 111.9745 248.1500 14.90398236 4001
MACSAT 2
1 20608U 90043B 93362.47083737 .00000243 00000-0 39518-4 0 9421
2 20608 89.9190 181.1030 0106520 329.3731 30.1292 14.64609640194292
Glonass 44
1 20619U 90045A 93363.09940842 -.00000029 00000-0 00000+0 0 9751
2 20619 65.3454 354.7422 0025459 216.9089 142.9228 2.13102996 28106
Glonass 45
1 20620U 90045B 93360.40246180 -.00000029 00000-0 00000+0 0 9748
2 20620 65.3403 354.8273 0006583 21.5989 338.4647 2.13102784 28082
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Glonass 46
1 20621U 90045C 93356.24303712 -.00000038 00000-0 10000-3 0 6440
2 20621 65.3736 354.9822 0015177 203.1505 156.8191 2.13101005 27994
Kristall
1 20635U 90048A 93361.89242141 .00013070 00000-0 16868-3 0 5854
2 20635 51.6181 326.3116 0005672 135.9706 224.2722 15.59333021449340
ROSAT
1 20638U 90049A 93362.26804250 .00000538 00000-0 55018-4 0 2498
2 20638 52.9870 38.6369 0011026 271.0343 88.9387 15.06549132196316
Meteor 2-19
1 20670U 90057A 93362.06042048 .00000023 00000-0 79036-5 0 7424
2 20670 82.5450 344.3934 0014555 269.7083 90.2412 13.84185237176943
CRRES
1 20712U 90065A 93362.97003404 .00000778 00000-0 76940-3 0 8217
2 20712 17.7353 258.1954 7197729 60.3977 351.8167 2.34901511 21884
GPS BII-08
1 20724U 90068A 93353.09245949 .00000062 00000-0 10000-3 0 7432
2 20724 54.7282 145.2054 0109489 156.4371 204.0479 2.00562007 24738
Feng Yun1-2
1 20788U 90081A 93360.47055517 .00000417 00000-0 30433-3 0 8513
2 20788 98.8535 21.0647 0016083 128.7875 238.6680 14.01407715169516
Meteor 2-20
1 20826U 90086A 93362.27946736 .00000083 00000-0 61800-4 0 7413
2 20826 82.5264 281.9547 0012825 160.7503 199.4144 13.83567961164128
GPS BII-09
1 20830U 90088A 93353.64315702 -.00000030 00000-0 10000-3 0 7423
2 20830 55.3652 87.4848 0068372 106.8946 253.8683 2.00557381 23821
GPS BIIA-10
1 20959U 90103A 93361.02775120 .00000050 00000-0 10000-3 0 6484
2 20959 54.9096 146.7403 0078557 222.5235 136.8466 2.00570369 22569
DMSP B5D2-5
1 20978U 90105A 93354.06098255 .00000212 00000-0 91955-4 0 3723
2 20978 98.7123 52.0843 0079298 332.1215 27.5730 14.32340918159466
Glonass 47
1 21006U 90110A 93364.25141426 .00000028 00000-0 00000+0 0 5816
2 21006 64.9119 115.0650 0060330 186.6454 173.2685 2.13102810 23831
Glonass 48
1 21007U 90110B 93361.62048949 .00000008 00000-0 00000+0 0 6731
2 21007 64.9448 115.2093 0037651 178.9880 181.0040 2.13101361 23772
Glonass 49
1 21008U 90110C 93362.91455242 .00000018 00000-0 00000+0 0 6789
2 21008 64.9249 115.1277 0008959 277.1126 82.7726 2.13099439 23780
INFORMTR-1
1 21087U 91006A 93363.78995260 .00000094 00000-0 82657-4 0 4017
2 21087 82.9450 268.0636 0034363 194.3521 165.6661 13.74530789146316
Cosmos 2123
1 21089U 91007A 93362.84080438 .00000036 00000-0 22759-4 0 6439
2 21089 82.9219 137.7780 0028333 221.5044 138.3962 13.74032271145252
MOP-2
1 21140U 91015B 93361.36615986 -.00000083 00000-0 00000+0 0 6437
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2 21140 0.3555 53.1716 0001137 217.9004 306.4960 1.00192402 5266
Nadezhda 3
1 21152U 91019A 93362.24439862 .00000030 00000-0 16031-4 0 7426
2 21152 82.9267 93.8356 0041537 333.5011 26.4023 13.73492423139926
Glonass 50
1 21216U 91025A 93356.29198472 -.00000039 00000-0 10000-3 0 2380
2 21216 65.0939 354.8012 0011611 213.6689 146.2909 2.13103224 21174
Glonass 51
1 21217U 91025B 93362.92629983 -.00000029 00000-0 10000-3 0 5803
2 21217 65.0868 354.5716 0012555 242.2353 117.6594 2.13102045 21305
Glonass 52
1 21218U 91025C 93352.24839345 -.00000060 00000-0 10000-3 0 1174
2 21218 65.0758 354.9111 0012316 217.9351 142.1123 2.13100382 21087
GRO
1 21225U 91027B 93356.46954065 .00003496 00000-0 79758-4 0 382
2 21225 28.4628 17.8570 0003464 25.0031 335.0734 15.39616634 29662
Meteor 3-4
1 21232U 91030A 93361.86310622 .00000050 00000-0 10000-3 0 6483
2 21232 82.5410 290.7099 0011909 255.3812 104.5990 13.16458134128818
NOAA 12
1 21263U 91032A 93354.09713546 .00000151 00000-0 87438-4 0 8471
2 21263 98.6387 20.6638 0013805 38.8062 321.4103 14.22347172135079
OKEAN 3
1 21397U 91039A 93362.33624663 .00000335 00000-0 45058-4 0 9436
2 21397 82.5289 254.8643 0024175 94.2171 266.1782 14.76081656138304
GPS BIIA-11
1 21552U 91047A 93356.31335476 -.00000048 00000-0 10000-3 0 6516
2 21552 55.6597 84.9049 0053648 233.5364 125.9911 2.00570875 18067
ERS-1
1 21574U 91050A 93364.22373162 .00000113 00000-0 55821-4 0 3720
2 21574 98.5261 76.1216 0001056 81.9691 278.1614 14.34154317128475
UO-22
1 21575U 91050B 93362.39229816 .00000047 00000-0 30411-4 0 4436
2 21575 98.4537 75.2021 0008751 77.8526 282.3610 14.36876541128559
ORBCOMM-X
1 21576U 91050C 93362.46525766 .00000103 00000-0 50104-4 0 5433
2 21576 98.4520 74.2953 0005310 87.0171 273.1631 14.36265601128507
TUBSAT
1 21577U 91050D 93362.22748834 .00000027 00000-0 23887-4 0 4433
2 21577 98.4533 74.4666 0007610 81.2097 278.9951 14.36412256128499
SARA
1 21578U 91050E 93362.22833209 .00000402 00000-0 14528-3 0 6457
2 21578 98.4618 76.9453 0005897 83.3628 276.8230 14.38624605128620
TDRS 4
1 21639U 91054B 93361.37531491 .00000101 00000-0 00000+0 0 6566
2 21639 0.0564 60.8617 0001158 252.2769 103.5962 1.00276979 6850
Meteor 3-5
1 21655U 91056A 93362.17791313 .00000051 00000-0 10000-3 0 6453
2 21655 82.5558 237.5032 0012942 268.1655 91.7985 13.16826722113953
UARS
```

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1 21701U 91063B 93362.29467793 .00002147 00000-0 20924-3 0 4449
2 21701 56.9814 123.8167 0005590 106.6502 253.5156 14.96341260125352
DMSP B5D2-6
1 21798U 91082A 93354.03768126 .00000156 00000-0 10625-3 0 253
2 21798 98.9600 354.4858 0012200 288.9538 71.0307 14.13744863106305
Glonass 53
1 21853U 92005A 93357.15381600 .00000009 00000-0 10000-3 0 8415
2 21853 64.8697 115.0479 0005470 203.4495 156.5369 2.13102167 14790
Glonass 54
1 21854U 92005B 93363.07758121 .00000018 00000-0 00000+0 0 8763
2 21854 64.8705 114.8222 0015977 17.4955 342.5471 2.13102974 14901
Glonass 55
1 21855U 92005C 93364.07652965 .00000026 00000-0 00000+0 0 8730
2 21855 64.8647 114.7921 0007727 199.4515 160.4856 2.13101772 14919
JERS-1
1 21867U 92007A 93363.49612925 .00002419 00000-0 20620-3 0 1816
2 21867 97.6638 76.5186 0002171 94.5465 265.6007 14.98667929102967
GPS BIIA-12
1 21890U 92009A 93362.75444105 .00000007 00000-0 10000-3 0 4483
2 21890 54.2323 263.7780 0056135 159.4432 200.8475 2.00557726 13567
GPS BIIA-13
1 21930U 92019A 93356.48295540 -.00000070 00000-0 10000-3 0 4446
2 21930 55.5306 24.8858 0057192 167.7685 192.4241 2.00563489 12362
EUVE
1 21987U 92031A 93363.56158239 .00002237 00000-0 97444-4 0 2477
2 21987 28.4344 111.6228 0010690 286.0448 73.8963 15.17953380 86599
SAMPEX
1 22012U 92038A 93362.27899082 .00002102 00000-0 17969-3 0 4510
2 22012 81.6721 350.6231 0116780 235.1184 123.9074 14.92008156 80843
GPS BIIA-14
1 22014U 92039A 93363.49699265 .00000092 00000-0 10000-3 0 3467
2 22014 54.9103 204.5033 0082335 295.6878 63.5260 2.00570177 4348
Glonass 56
1 22056U 92047A 93363.97735806 -.00000030 00000-0 00000+0 0 7740
2 22056 64.9239 354.7616 0007522 274.6682 85.2632 2.13103088 11007
Glonass 57
1 22057U 92047B 93361.45561228 -.00000029 00000-0 00000+0 0 7802
2 22057 64.9380 354.8734 0009438 308.5998 51.3316 2.13102687 10929
Glonass 58
1 22058U 92047C 93363.27367140 -.00000030 00000-0 00000+0 0 7804
2 22058 64.9307 354.7914 0012123 259.9389 99.9758 2.13102995 11017
TOPEX
1 22076U 92052A 93363.53663123 -.00000038 00000-0 10000-3 0 7026
2 22076 66.0434 283.3794 0007760 266.4189 93.5938 12.80931275 64762
KITSAT-A
1 22077U 92052B 93362.88719632 -.00000037 00000-0 10000-3 0 3396
2 22077 66.0871 276.5452 0007562 329.2575 30.7992 12.86282651 64889
S80/T
1 22078U 92052C 93362.85471598 -.00000037 00000-0 10000-3 0 3390
2 22078 66.0870 276.0765 0008813 334.2281 25.8297 12.86564220 64946
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TOPEX R/B
1 22079U 92052D 93362.29585411 -.00000038 00000-0 10000-3 0 3390
2 22079 66.0715 293.4385 0076305 274.9441 84.2865 12.77661551 64513
GPS BIIA-15
1 22108U 92058A 93362.46366951 .00000005 00000-0 10000-3 0 3443
2 22108 54.4421 264.4535 0105205 133.4512 227.4972 2.00570352 9507
FREJA
1 22161U 92064A 93362.46372027 .00000085 00000-0 89233-4 0 3432
2 22161 63.0068 4.5354 0776403 300.0279 52.5888 13.21707704 59233
LAGEOS II
1 22195U 92070B 93362.14836351 -.00000009 00000-0 10000-3 0 2437
2 22195 52.6394 201.7895 0138487 42.8948 318.2326 6.47293933 27873
GPS BIIA-16
1 22231U 92079A 93362.65059636 .00000095 00000-0 10000-3 0 3464
2 22231 54.6604 205.7107 0034753 298.7940 60.9158 2.00563690 8086
GPS BIIA-17
1 22275U 92089A 93360.79805101 .00000102 00000-0 10000-3 0 3517
2 22275 54.6779 203.4155 0051436 255.2517 104.2527 2.00554790 7453
TDRS 5
1 22314U 93003B 93354.41251642 -.00000270 00000-0 10000-3 0 3444
2 22314 0.7142 72.4095 0001106 247.4586 231.8383 1.00273852 3536
GPS BIIA-18
1 22446U 93007A 93359.87827427 -.00000075 00000-0 10000-3 0 3420
2 22446 54.7999 324.3990 0069591 339.0912 20.6334 2.00546556 6467
Glonass 59
1 22512U 93010A 93363.25471862 .00000020 00000-0 00000+0 0 4811
2 22512 64.8778 114.6692 0009461 192.7307 167.2368 2.13102174 6495
Glonass 60
1 22513U 93010B 93363.19535775 .00000019 00000-0 00000+0 0 4918
2 22513 64.8608 114.6931 0007165 187.6216 172.3602 2.13102697 6684
Glonass 61
1 22514U 93010C 93362.02296772 .00000010 00000-0 00000+0 0 4765
2 22514 64.8904 114.7120 0014233 188.9111 171.0572 2.13102148 6668
ASTRO-D
1 22521U 93011A 93362.54634563 .00001543 00000-0 12987-3 0 2430
2 22521 31.1039 67.4508 0076701 226.0912 133.3366 14.92814372 46572
UFO F1
1 22563U 93015A 93360.57511272 -.00000118 00000-0 10000-3 0 2401
2 22563 26.9515 302.3024 0008966 307.8252 234.1259 0.99253624 7124
GPS BIIA-19
1 22581U 93017A 93363.01101522 -.00000038 00000-0 10000-3 0 2533
2 22581 55.0115 24.4477 0037365 13.5428 346.6088 2.00573635 5542
ProgressM17
1 22588U 93019A 93364.18399423 .00125173 17129-4 25647-3 0 4176
2 22588 51.6219 304.7977 0085919 78.3606 282.7031 15.92499169 42802
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
GPS BIIA-20
1 22657U 93032A 93363.14026467 -.00000038 00000-0 00000+0 0 2436
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2 22657 55.0663 24.2654 0061602 260.1911 99.1797 2.00566212 878
GPS BIIA-21
1 22700U 93042A 93359.62015108 -.00000018 00000-0 10000-3 0 2459
2 22700 54.6927 265.2432 0011520 315.3128 44.7020 2.00572423 3603
Soyuz TM-17
1 22704U 93043A 93361.89242141 .00013070 00000-0 16868-3 0 2915
2 22704 51.6181 326.3116 0005672 135.9706 224.2722 15.59333021449349
NOAA 13
1 22739U 93050A 93355.85368691 .00000050 00000-0 52689-4 0 2421
2 22739 98.9278 296.1279 0009037 262.5525 97.4616 14.10868985 18956
GPS BIIA-22
1 22779U 93054A 93361.20412174 -.00000070 00000-0 10000-3 0 2604
2 22779 54.8946 324.2336 0021316 215.9345 143.9114 2.00559645 2393
Meteor 2-21
1 22782U 93055A 93362.91772042 .00000054 00000-0 36147-4 0 2423
2 22782 82.5473 341.3647 0022838 347.0390 13.0185 13.82995463 16554
UFO F2
1 22787U 93056A 93356.63242100 -.00000051 00000-0 10000-3 0 2403
2 22787 5.0031 322.9604 0005230 338.7928 88.6721 1.00277236 25
SPOT 3
1 22823U 93061A 93361.79110355 .00000169 00000-0 10000-3 0 2497
2 22823 98.7348 73.7246 0000697 29.5312 330.5877 14.20024746 13165
STELLA
1 22824U 93061B 93362.60733396 -.00000046 00000-0 -86135-6 0 2418
2 22824 98.6745 74.9646 0006843 356.1384 3.9753 14.27093760 13343
KO-25
1 22825U 93061C 93362.71502970 .00000018 00000-0 25222-4 0 2418
2 22825 98.6728 75.1048 0008935 352.3570 7.7472 14.27597768 13362
POSAT-1
1 22826U 93061D 93362.70832665 .00000012 00000-0 22595-4 0 2420
2 22826 98.6726 75.1103 0009492 353.4556 6.6499 14.27700094 13363
HEATHSAT
1 22827U 93061E 93362.63162629 .00000094 00000-0 55871-4 0 3041
2 22827 98.6666 75.0132 0009901 342.3392 17.7430 14.27803105 13352
ITAMSAT
1 22828U 93061F 93362.63162768 .00000037 00000-0 32652-4 0 2415
2 22828 98.6675 75.0188 0009505 342.2645 17.8203 14.27802410 13351
EYESAT-1
1 22829U 93061G 93362.61920446 .00000038 00000-0 33117-4 0 2349
2 22829 98.6675 75.0256 0010212 340.0264 20.0536 14.27992747 13356
1993 061H
1 22830U 93061H 93362.19680552 .00000030 00000-0 29598-4 0 2424
2 22830 98.5723 73.6658 0010898 323.0543 36.9888 14.28024415 13290
GPS BIIA-23
1 22877U 93068A 93361.25560941 -.00000028 00000-0 10000-3 0 486
2 22877 55.0952 85.3561 0029894 282.9154 76.8147 2.00559333 1289
Meteosat 6
1 22912U 93073B 93354.26411376 -.00000072 00000-0 00000+0 0 442
2 22912 1.2948 268.8746 0000563 124.1560 140.0624 1.00324588 330
HST Array
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1 22920U 90037C 93362.89382885 .00007114 00000-0 63946-3 0 410
2 22920 28.4733 249.0296 0004530 273.0571 86.9555 14.93895843 3974
USA 98
1 22921U 93076A 93363.22447317 -.00000293 00000-0 00000+0 0 428
2 22921 4.1466 309.3292 0182004 240.9860 303.5618 0.99939219 110
1993076B
1 22922U 93076B 93363.52631442 .00011526 00000-0 39091-3 0 354
2 22922 23.0689 145.2270 1184897 297.4355 51.0520 13.12879599 2831
1993076C
1 22923U 93076C 93361.91965504 -.00000102 00000-0 10000-4 0 332
2 22923 23.2195 261.7747 7111955 178.3009 187.2085 2.24043143 456
1993072E
1 22925U 93072E 93361.76171441 .00000893 00000-0 84332-3 0 303
2 22925 47.3004 264.5000 7218001 10.9423 358.8539 2.32594303 535
1993072F
1 22926U 93072F 93360.82538544 .00003638 00000-0 11214-2 0 297
2 22926 47.2872 264.6044 7240142 10.4638 358.8418 2.33170854 304
TELSTAR 401
1 22927U 93077A 93354.06586493 -.00000117 00000-0 00000+0 0 320
2 22927 3.7932 271.3636 2464869 179.8740 180.6351 1.39369830 41
1993077B
1 22928U 93077B 93362.00615805 .00103448 14892-5 50053-2 0 318
2 22928 23.9650 271.4906 7291290 186.7794 152.6945 2.30355230 242
DBS
1 22930U 93078A 93363.15168130 -.00000099 00000-0 10000-3 0 301
2 22930 0.0145 309.3513 0004926 275.2285 186.3497 1.00256784 151
THAICOM
1 22931U 93078B 93360.99999999 -.00000108 00000-0 00000+0 0 324
2 22931 0.1130 252.6230 0003638 22.3620 259.1290 1.00271531 07
1993078C
1 22932U 93078C 93363.44112687 .01800564 19441-5 28251-2 0 249
2 22932 4.2226 280.6193 6987089 188.4968 20.9583 2.73719409 285
1993078D
1 22933U 93078D 93354.51861564 .00047050 00000-0 66014-2 0 240
2 22933 3.9603 284.3685 7319441 180.0427 180.2633 2.24933493 78
1993079A
1 22949U 93079A 93364.24334828 .00001102 00000-0 30290-3 0 186
2 22949 62.7950 349.5245 7399891 280.3211 10.9577 2.04423028 163
1993079B
1 22950U 93079B 93363.80746528 .00634246 80818-5 62115-3 0 185
2 22950 62.7896 323.7890 0110179 135.4305 237.6048 15.99457718 1119
1993079C
1 22951U 93079C 93363.07661137 .01160775 80602-5 69064-3 0 179
2 22951 62.7940 326.7029 0142803 123.4635 314.7447 15.99270570 1006
1993079D
1 22952U 93079D 93363.22216671 .00000999 00000-0 10000-4 0 71
2 22952 62.7964 349.6185 7393082 280.2525 10.9950 2.05965717 149
1993057C
1 22953U 93057C 93363.77819256 .06208873 77039-5 33076-3 0 206
2 22953 64.8660 165.9395 0025902 68.1438 65.0552 16.39223180 2098
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538. ORBS$365.OSCAR.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 16:36:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-365.o.1993@ampr.org>
Source record: 28400
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-365.O
Orbital Elements 365.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM WA5QGD FORT WORTH,TX December 31, 1993
BID: $ORBS-365.O
TO ALL RADIO AMATEURS BT

Satellite: AO-10
Catalog number: 14129
Epoch time: 93360.41320507
Element set: 237
Inclination: 27.2015 deg
RA of node: 349.6000 deg
Eccentricity: 0.6021502
Arg of perigee: 141.2833 deg
Mean anomaly: 282.9354 deg
Mean motion: 2.05879668 rev/day
Decay rate: -3.11e-06 rev/day^2
Epoch rev: 7922
Checksum: 270

Satellite: UO-11
Catalog number: 14781
Epoch time: 93362.07707859
Element set: 643
Inclination: 97.7938 deg
RA of node: 19.7461 deg
Eccentricity: 0.0012661
Arg of perigee: 94.0796 deg
Mean anomaly: 266.1858 deg
Mean motion: 14.69108205 rev/day
Decay rate: 2.13e-06 rev/day^2
Epoch rev: 52518
Checksum: 333

Satellite: RS-10/11
Catalog number: 18129
Epoch time: 93362.24286562
Element set: 841
Inclination: 82.9283 deg
RA of node: 95.2053 deg
Eccentricity: 0.0012703
Arg of perigee: 133.8292 deg
```

Mean anomaly: 226.3913 deg
Mean motion: 13.72328759 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 32646
Checksum: 308

Satellite: AO-13
Catalog number: 19216
Epoch time: 93358.73417009
Element set: 851
Inclination: 57.9609 deg
RA of node: 277.2102 deg
Eccentricity: 0.7211124
Arg of perigee: 331.1032 deg
Mean anomaly: 3.3836 deg
Mean motion: 2.09723023 rev/day
Decay rate: -3.59e-06 rev/day^2
Epoch rev: 4235
Checksum: 277

Satellite: FO-20
Catalog number: 20480
Epoch time: 93364.10373196
Element set: 640
Inclination: 99.0174 deg
RA of node: 183.0203 deg
Eccentricity: 0.0541189
Arg of perigee: 2.6742 deg
Mean anomaly: 357.7056 deg
Mean motion: 12.83223163 rev/day
Decay rate: -1.8e-07 rev/day^2
Epoch rev: 18244
Checksum: 281

Satellite: AO-21
Catalog number: 21087
Epoch time: 93363.78995260
Element set: 401
Inclination: 82.9450 deg
RA of node: 268.0636 deg
Eccentricity: 0.0034363
Arg of perigee: 194.3521 deg
Mean anomaly: 165.6661 deg
Mean motion: 13.74530789 rev/day
Decay rate: 9.4e-07 rev/day^2
Epoch rev: 14631
Checksum: 316

Satellite: RS-12/13
Catalog number: 21089
Epoch time: 93362.84080438

Element set: 643
Inclination: 82.9219 deg
RA of node: 137.7780 deg
Eccentricity: 0.0028333
Arg of perigee: 221.5044 deg
Mean anomaly: 138.3962 deg
Mean motion: 13.74032271 rev/day
Decay rate: 3.6e-07 rev/day^2
Epoch rev: 14525
Checksum: 298

Satellite: ARSENE
Catalog number: 22654
Epoch time: 93321.93138545
Element set: 210
Inclination: 1.4185 deg
RA of node: 113.8817 deg
Eccentricity: 0.2935300
Arg of perigee: 161.0091 deg
Mean anomaly: 211.2000 deg
Mean motion: 1.42195961 rev/day
Decay rate: -5.1e-07 rev/day^2
Epoch rev: 275
Checksum: 241

/EX

539. ORBS$365.MICRO.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 16:39:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-365.d.1993@ampr.org>
Source record: 28401
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-365.D
Orbital Elements 365.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM WA5QGD FORT WORTH,TX December 31, 1993
BID: $ORBS-365.D
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time: 93362.19825192
Element set: 942
Inclination: 98.6028 deg
RA of node: 84.2277 deg
Eccentricity: 0.0011292
Arg of perigee: 337.6205 deg
Mean anomaly: 22.4483 deg
Mean motion: 14.29812711 rev/day
Decay rate: 4.6e-07 rev/day^2
Epoch rev: 20515
Checksum: 293

Satellite: AO-16
Catalog number: 20439
Epoch time: 93362.19044136
Element set: 743
Inclination: 98.6109 deg
RA of node: 85.2804 deg
Eccentricity: 0.0011413
Arg of perigee: 338.4753 deg
Mean anomaly: 21.5948 deg
Mean motion: 14.29868863 rev/day
Decay rate: 2.1e-07 rev/day^2
Epoch rev: 20516
Checksum: 305

Satellite: DO-17
Catalog number: 20440
Epoch time: 93362.72112281
Element set: 743
Inclination: 98.6115 deg
RA of node: 86.0734 deg
Eccentricity: 0.0011486
Arg of perigee: 336.0862 deg
```

Mean anomaly: 23.9786 deg
Mean motion: 14.30006589 rev/day
Decay rate: 2.2e-07 rev/day^2
Epoch rev: 20525
Checksum: 285

Satellite: WO-18
Catalog number: 20441
Epoch time: 93362.27369208
Element set: 744
Inclination: 98.6107 deg
RA of node: 85.6427 deg
Eccentricity: 0.0012153
Arg of perigee: 337.9287 deg
Mean anomaly: 22.1370 deg
Mean motion: 14.29983727 rev/day
Decay rate: 2.9e-07 rev/day^2
Epoch rev: 20519
Checksum: 315

Satellite: LO-19
Catalog number: 20442
Epoch time: 93362.19321976
Element set: 742
Inclination: 98.6119 deg
RA of node: 85.7807 deg
Eccentricity: 0.0012433
Arg of perigee: 337.6335 deg
Mean anomaly: 22.4304 deg
Mean motion: 14.30076764 rev/day
Decay rate: 2.2e-07 rev/day^2
Epoch rev: 20519
Checksum: 293

Satellite: UO-22
Catalog number: 21575
Epoch time: 93362.39229816
Element set: 443
Inclination: 98.4537 deg
RA of node: 75.2021 deg
Eccentricity: 0.0008751
Arg of perigee: 77.8526 deg
Mean anomaly: 282.3610 deg
Mean motion: 14.36876541 rev/day
Decay rate: 4.7e-07 rev/day^2
Epoch rev: 12855
Checksum: 317

Satellite: KO-23
Catalog number: 22077
Epoch time: 93362.88719632

Element set: 339
Inclination: 66.0871 deg
RA of node: 276.5452 deg
Eccentricity: 0.0007562
Arg of perigee: 329.2575 deg
Mean anomaly: 30.7992 deg
Mean motion: 12.86282651 rev/day
Decay rate: -3.7e-07 rev/day^2
Epoch rev: 6488
Checksum: 336

Satellite: AO-27
Catalog number: 22825
Epoch time: 93362.71502970
Element set: 241
Inclination: 98.6728 deg
RA of node: 75.1048 deg
Eccentricity: 0.0008935
Arg of perigee: 352.3570 deg
Mean anomaly: 7.7472 deg
Mean motion: 14.27597768 rev/day
Decay rate: 1.8e-07 rev/day^2
Epoch rev: 1336
Checksum: 320

Satellite: IO-26
Catalog number: 22826
Epoch time: 93362.70832665
Element set: 242
Inclination: 98.6726 deg
RA of node: 75.1103 deg
Eccentricity: 0.0009492
Arg of perigee: 353.4556 deg
Mean anomaly: 6.6499 deg
Mean motion: 14.27700094 rev/day
Decay rate: 1.2e-07 rev/day^2
Epoch rev: 1336
Checksum: 301

Satellite: KO-25
Catalog number: 22830
Epoch time: 93362.19680552
Element set: 242
Inclination: 98.5723 deg
RA of node: 73.6658 deg
Eccentricity: 0.0010898
Arg of perigee: 323.0543 deg
Mean anomaly: 36.9888 deg
Mean motion: 14.28024415 rev/day
Decay rate: 3.0e-07 rev/day^2
Epoch rev: 1329

```
Checksum: 306

/EX
```

540. ORBS$365.WEATH,AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 16:42:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-365.w.1993@ampr.org>
Source record: 28403
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-365.W
Orbital Elements 365.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM WA5QGD FORT WORTH,TX December 31, 1993
BID: $ORBS-365.W
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time: 93354.09639046
Element set: 642
Inclination: 99.0778 deg
RA of node: 37.2630 deg
Eccentricity: 0.0015442
Arg of perigee: 8.0271 deg
Mean anomaly: 352.1146 deg
Mean motion: 14.13572305 rev/day
Decay rate: 1.13e-06 rev/day^2
Epoch rev: 46504
Checksum: 283

Satellite: NOAA-10
Catalog number: 16969
Epoch time: 93354.02187208
Element set: 540
Inclination: 98.5124 deg
RA of node: 3.4782 deg
Eccentricity: 0.0013795
Arg of perigee: 128.8764 deg
Mean anomaly: 231.3649 deg
Mean motion: 14.24851603 rev/day
Decay rate: 6.2e-07 rev/day^2
Epoch rev: 37709
Checksum: 314

Satellite: MET-2/17
Catalog number: 18820
Epoch time: 93362.20414100
Element set: 241
Inclination: 82.5428 deg
RA of node: 44.6042 deg
Eccentricity: 0.0015693
Arg of perigee: 305.2443 deg
```

Mean anomaly: 54.7243 deg
Mean motion: 13.84703211 rev/day
Decay rate: 5.6e-07 rev/day^2
Epoch rev: 29869
Checksum: 276

Satellite: MET-3/2
Catalog number: 19336
Epoch time: 93362.22551918
Element set: 242
Inclination: 82.5429 deg
RA of node: 84.6681 deg
Eccentricity: 0.0016253
Arg of perigee: 335.1957 deg
Mean anomaly: 24.8381 deg
Mean motion: 13.16962602 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 26075
Checksum: 303

Satellite: NOAA-11
Catalog number: 19531
Epoch time: 93354.12874457
Element set: 440
Inclination: 99.1549 deg
RA of node: 333.8243 deg
Eccentricity: 0.0011091
Arg of perigee: 278.6226 deg
Mean anomaly: 81.3688 deg
Mean motion: 14.12942396 rev/day
Decay rate: 1.06e-06 rev/day^2
Epoch rev: 26993
Checksum: 320

Satellite: MET-2/18
Catalog number: 19851
Epoch time: 93362.79483548
Element set: 242
Inclination: 82.5220 deg
RA of node: 279.7621 deg
Eccentricity: 0.0014935
Arg of perigee: 351.2669 deg
Mean anomaly: 8.8229 deg
Mean motion: 13.84353093 rev/day
Decay rate: 7.9e-07 rev/day^2
Epoch rev: 24411
Checksum: 328

Satellite: MET-3/3
Catalog number: 20305
Epoch time: 93362.87463836

Element set: 956
Inclination: 82.5503 deg
RA of node: 27.7388 deg
Eccentricity: 0.0007101
Arg of perigee: 1.6384 deg
Mean anomaly: 358.4743 deg
Mean motion: 13.04420277 rev/day
Decay rate: 4.4e-07 rev/day^2
Epoch rev: 20069
Checksum: 293

Satellite: MET-2/19
Catalog number: 20670
Epoch time: 93362.06042048
Element set: 742
Inclination: 82.5450 deg
RA of node: 344.3934 deg
Eccentricity: 0.0014555
Arg of perigee: 269.7083 deg
Mean anomaly: 90.2412 deg
Mean motion: 13.84185237 rev/day
Decay rate: 2.3e-07 rev/day^2
Epoch rev: 17694
Checksum: 299

Satellite: FY-1/2
Catalog number: 20788
Epoch time: 93360.47055517
Element set: 851
Inclination: 98.8535 deg
RA of node: 21.0647 deg
Eccentricity: 0.0016083
Arg of perigee: 128.7875 deg
Mean anomaly: 238.6680 deg
Mean motion: 14.01407715 rev/day
Decay rate: 4.17e-06 rev/day^2
Epoch rev: 16951
Checksum: 318

Satellite: MET-2/20
Catalog number: 20826
Epoch time: 93362.27946736
Element set: 741
Inclination: 82.5264 deg
RA of node: 281.9547 deg
Eccentricity: 0.0012825
Arg of perigee: 160.7503 deg
Mean anomaly: 199.4144 deg
Mean motion: 13.83567961 rev/day
Decay rate: 8.3e-07 rev/day^2
Epoch rev: 16412

Checksum: 321

Satellite: MET-3/4
Catalog number: 21232
Epoch time: 93361.86310622
Element set: 648
Inclination: 82.5410 deg
RA of node: 290.7099 deg
Eccentricity: 0.0011909
Arg of perigee: 255.3812 deg
Mean anomaly: 104.5990 deg
Mean motion: 13.16458134 rev/day
Decay rate: 5.0e-07 rev/day^2
Epoch rev: 12881
Checksum: 287

Satellite: NOAA-12
Catalog number: 21263
Epoch time: 93354.09713546
Element set: 847
Inclination: 98.6387 deg
RA of node: 20.6638 deg
Eccentricity: 0.0013805
Arg of perigee: 38.8062 deg
Mean anomaly: 321.4103 deg
Mean motion: 14.22347172 rev/day
Decay rate: 1.51e-06 rev/day^2
Epoch rev: 13507
Checksum: 285

Satellite: MET-3/5
Catalog number: 21655
Epoch time: 93362.17791313
Element set: 645
Inclination: 82.5558 deg
RA of node: 237.5032 deg
Eccentricity: 0.0012942
Arg of perigee: 268.1655 deg
Mean anomaly: 91.7985 deg
Mean motion: 13.16826722 rev/day
Decay rate: 5.1e-07 rev/day^2
Epoch rev: 11395
Checksum: 316

Satellite: MET-2/21
Catalog number: 22782
Epoch time: 93362.91772042
Element set: 242
Inclination: 82.5473 deg
RA of node: 341.3647 deg
Eccentricity: 0.0022838

```
Arg of perigee: 347.0390 deg
Mean anomaly: 13.0185 deg
Mean motion: 13.82995463 rev/day
Decay rate: 5.4e-07 rev/day^2
Epoch rev: 1655
Checksum: 300

/EX
```

541. ORBS$365.MISC.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 16:44:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-365.m.1993@ampr.org>
Source record: 28399
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-365.M
Orbital Elements 365.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM WA5QGD FORT WORTH,TX December 31, 1993
BID: $ORBS-365.M
TO ALL RADIO AMATEURS BT

Satellite: MIR
Catalog number: 16609
Epoch time: 93364.19950354
Element set: 66
Inclination: 51.6194 deg
RA of node: 314.7124 deg
Eccentricity: 0.0005815
Arg of perigee: 145.1002 deg
Mean anomaly: 215.0377 deg
Mean motion: 15.59385717 rev/day
Decay rate: 1.0973e-04 rev/day^2
Epoch rev: 44968
Checksum: 309

Satellite: HUBBLE
Catalog number: 20580
Epoch time: 93363.20816968
Element set: 413
Inclination: 28.4701 deg
RA of node: 247.6909 deg
Eccentricity: 0.0006246
Arg of perigee: 111.9745 deg
Mean anomaly: 248.1500 deg
Mean motion: 14.90398236 rev/day
Decay rate: 7.99e-06 rev/day^2
Epoch rev: 400
Checksum: 295

Satellite: GRO
Catalog number: 21225
Epoch time: 93356.46954065
Element set: 38
Inclination: 28.4628 deg
RA of node: 17.8570 deg
Eccentricity: 0.0003464
Arg of perigee: 25.0031 deg
```

Mean anomaly: 335.0734 deg
Mean motion: 15.39616634 rev/day
Decay rate: 3.496e-05 rev/day^2
Epoch rev: 2966
Checksum: 296

Satellite: UARS
Catalog number: 21701
Epoch time: 93362.29467793
Element set: 444
Inclination: 56.9814 deg
RA of node: 123.8167 deg
Eccentricity: 0.0005590
Arg of perigee: 106.6502 deg
Mean anomaly: 253.5156 deg
Mean motion: 14.96341260 rev/day
Decay rate: 2.147e-05 rev/day^2
Epoch rev: 12535
Checksum: 294

Satellite: POSAT
Catalog number: 22829
Epoch time: 93362.61920446
Element set: 234
Inclination: 98.6675 deg
RA of node: 75.0256 deg
Eccentricity: 0.0010212
Arg of perigee: 340.0264 deg
Mean anomaly: 20.0536 deg
Mean motion: 14.27992747 rev/day
Decay rate: 3.8e-07 rev/day^2
Epoch rev: 1335
Checksum: 279

/EX

542. ORBS$365.2L.AMSAT

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 16:47:00 UTC
From: ray.hoad@drig.com
Message-ID: <$orbs-365.n.1993@ampr.org>
Source record: 28402
Cross-posted to: rec.radio.amateur.space,rec.radio.info

```
SB KEPS @ AMSAT $ORBS-365.N
2Line Orbital Elements 365.AMSAT

HR AMSAT ORBITAL ELEMENTS FOR AMATEUR SATELLITES IN NASA FORMAT
FROM WA5QGD FORT WORTH,TX December 31, 1993
BID: $ORBS-365.N

DECODE 2-LINE ELSETS WITH THE FOLLOWING KEY:
1 AAAAAU 00 0 0 BBBBB.BBBBBBBB .CCCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

TO ALL RADIO AMATEURS BT

AO-10
1 14129U 83058B 93360.41320507 -.00000311 00000-0 10000-3 0 2379
2 14129 27.2015 349.6000 6021502 141.2833 282.9354 2.05879668 79220
UO-11
1 14781U 84021B 93362.07707859 .00000213 00000-0 44030-4 0 6439
2 14781 97.7938 19.7461 0012661 94.0796 266.1858 14.69108205525188
RS-10/11
1 18129U 87054A 93362.24286562 .00000047 00000-0 35308-4 0 8413
2 18129 82.9283 95.2053 0012703 133.8292 226.3913 13.72328759326464
AO-13
1 19216U 88051B 93358.73417009 -.00000359 00000-0 10000-4 0 8510
2 19216 57.9609 277.2102 7211124 331.1032 3.3836 2.09723023 42354
FO-20
1 20480U 90013C 93364.10373196 -.00000018 00000-0 32924-4 0 6409
2 20480 99.0174 183.0203 0541189 2.6742 357.7056 12.83223163182445
AO-21
1 21087U 91006A 93363.78995260 .00000094 00000-0 82657-4 0 4017
2 21087 82.9450 268.0636 0034363 194.3521 165.6661 13.74530789146316
RS-12/13
1 21089U 91007A 93362.84080438 .00000036 00000-0 22759-4 0 6439
2 21089 82.9219 137.7780 0028333 221.5044 138.3962 13.74032271145252
ARSENE
1 22654U 93031B 93321.93138545 -.00000051 00000-0 10000-3 0 2108
2 22654 1.4185 113.8817 2935300 161.0091 211.2000 1.42195961 2757
UO-14
1 20437U 90005B 93362.19825192 .00000046 00000-0 34841-4 0 9422
2 20437 98.6028 84.2277 0011292 337.6205 22.4483 14.29812711205154
AO-16
1 20439U 90005D 93362.19044136 .00000021 00000-0 25387-4 0 7432
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2 20439 98.6109 85.2804 0011413 338.4753 21.5948 14.29868863205161
DO-17
1 20440U 90005E 93362.72112281 .00000022 00000-0 25520-4 0 7430
2 20440 98.6115 86.0734 0011486 336.0862 23.9786 14.30006589205253
WO-18
1 20441U 90005F 93362.27369208 .00000029 00000-0 28118-4 0 7448
2 20441 98.6107 85.6427 0012153 337.9287 22.1370 14.29983727205191
LO-19
1 20442U 90005G 93362.19321976 .00000022 00000-0 25674-4 0 7425
2 20442 98.6119 85.7807 0012433 337.6335 22.4304 14.30076764205196
UO-22
1 21575U 91050B 93362.39229816 .00000047 00000-0 30411-4 0 4436
2 21575 98.4537 75.2021 0008751 77.8526 282.3610 14.36876541128559
KO-23
1 22077U 92052B 93362.88719632 -.00000037 00000-0 10000-3 0 3396
2 22077 66.0871 276.5452 0007562 329.2575 30.7992 12.86282651 64889
AO-27
1 22825U 93061C 93362.71502970 .00000018 00000-0 25222-4 0 2418
2 22825 98.6728 75.1048 0008935 352.3570 7.7472 14.27597768 13362
IO-26
1 22826U 93061D 93362.70832665 .00000012 00000-0 22595-4 0 2420
2 22826 98.6726 75.1103 0009492 353.4556 6.6499 14.27700094 13363
KO-25
1 22830U 93061H 93362.19680552 .00000030 00000-0 29598-4 0 2424
2 22830 98.5723 73.6658 0010898 323.0543 36.9888 14.28024415 13290
NOAA-9
1 15427U 84123A 93354.09639046 .00000113 00000-0 84054-4 0 6423
2 15427 99.0778 37.2630 0015442 8.0271 352.1146 14.13572305465048
NOAA-10
1 16969U 86073A 93354.02187208 .00000062 00000-0 44748-4 0 5408
2 16969 98.5124 3.4782 0013795 128.8764 231.3649 14.24851603377095
MET-2/17
1 18820U 88005A 93362.20414100 .00000056 00000-0 36911-4 0 2410
2 18820 82.5428 44.6042 0015693 305.2443 54.7243 13.84703211298694
MET-3/2
1 19336U 88064A 93362.22551918 .00000051 00000-0 10000-3 0 2425
2 19336 82.5429 84.6681 0016253 335.1957 24.8381 13.16962602260759
NOAA-11
1 19531U 88089A 93354.12874457 .00000106 00000-0 81723-4 0 4407
2 19531 99.1549 333.8243 0011091 278.6226 81.3688 14.12942396269933
MET-2/18
1 19851U 89018A 93362.79483548 .00000079 00000-0 57302-4 0 2429
2 19851 82.5220 279.7621 0014935 351.2669 8.8229 13.84353093244113
MET-3/3
1 20305U 89086A 93362.87463836 .00000044 00000-0 10000-3 0 9564
2 20305 82.5503 27.7388 0007101 1.6384 358.4743 13.04420277200692
MET-2/19
1 20670U 90057A 93362.06042048 .00000023 00000-0 79036-5 0 7424
2 20670 82.5450 344.3934 0014555 269.7083 90.2412 13.84185237176943
FY-1/2
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1 20788U 90081A 93360.47055517 .00000417 00000-0 30433-3 0 8513
2 20788 98.8535 21.0647 0016083 128.7875 238.6680 14.01407715169516
MET-2/20
1 20826U 90086A 93362.27946736 .00000083 00000-0 61800-4 0 7413
2 20826 82.5264 281.9547 0012825 160.7503 199.4144 13.83567961164128
MET-3/4
1 21232U 91030A 93361.86310622 .00000050 00000-0 10000-3 0 6483
2 21232 82.5410 290.7099 0011909 255.3812 104.5990 13.16458134128818
NOAA-12
1 21263U 91032A 93354.09713546 .00000151 00000-0 87438-4 0 8471
2 21263 98.6387 20.6638 0013805 38.8062 321.4103 14.22347172135079
MET-3/5
1 21655U 91056A 93362.17791313 .00000051 00000-0 10000-3 0 6453
2 21655 82.5558 237.5032 0012942 268.1655 91.7985 13.16826722113953
MET-2/21
1 22782U 93055A 93362.91772042 .00000054 00000-0 36147-4 0 2423
2 22782 82.5473 341.3647 0022838 347.0390 13.0185 13.82995463 16554
MIR
1 16609U 86017A 93364.19950354 .00010973 00000-0 14240-3 0 664
2 16609 51.6194 314.7124 0005815 145.1002 215.0377 15.59385717449681
HUBBLE
1 20580U 90037B 93363.20816968 .00000799 00000-0 64998-4 0 4134
2 20580 28.4701 247.6909 0006246 111.9745 248.1500 14.90398236 4001
GRO
1 21225U 91027B 93356.46954065 .00003496 00000-0 79758-4 0 382
2 21225 28.4628 17.8570 0003464 25.0031 335.0734 15.39616634 29662
UARS
1 21701U 91063B 93362.29467793 .00002147 00000-0 20924-3 0 4449
2 21701 56.9814 123.8167 0005590 106.6502 253.5156 14.96341260125352
POSAT
1 22829U 93061G 93362.61920446 .00000038 00000-0 33117-4 0 2349
2 22829 98.6675 75.0256 0010212 340.0264 20.0536 14.27992747 13356
/EX
```

543. Re: Post your Sat-Track software pick here

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 22:07:44 UTC
From: bwatson@nyx10.cs.du.edu
Message-ID: <1993Dec31.220744.11155@mnemosyne.cs.du.edu>
Source record: 28398

My favorite is Quicksat written by Mike McCants. It gives you
a choice of parameters for visual or radio observation.

544. Shuttle radio freqs???

Newsgroup: rec.radio.amateur.space
Date: 1993-12-31 23:52:59 UTC
From: JWT2@pge.com
Message-ID: <JWT2.25.2D24BB5B@pge.com>
Source record: 28404

I help teach math & science to 4th-6th grades at my daughter's school
every couple of weeks. I use the excellent satellite tracking program
STS Plus to display a map of the world that shows where various satellites
are. Using this to know when I would be in range of the shuttle, I want
to monitor appropriate VHF & HF freqs to let the kids hear the shuttle
as it passes. At least this is my plan. I am constantly looking for
ANY trick I can to get the kids interested in math and science.

So... How can I find out what freqs are used during a shuttle mission?

****
Jim Trudeau - Major Account Rep "I speak for me, not PG&E..."
Pacific Gas & Electric Co. Internet .... jwt2@pge.com
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P.O. Box 671 Phone 916/634-6413
Marysville, CA, USA 95901 Fax 916/634-6408
****